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THE EFFECTS OF RADIOTHERAPY AND ITS VALUE IN CLINICAL MEDICINE*

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Radiotherapy as a rule indicates the treatment by radiations from radium or from a high voltage roentgen apparatus. The mode of action of the gamma rays of radium and its effects upon the tissues are analogous to the radiations from the high voltage roentgen apparatus, though the rays from radium are more penetrating and more effective in selected cases. There has been such remarkable progress in the clinical and experimental phases of radiation therapy, that it has been recognized as a therapeutic agent of distinct value in the practice of medicine.

The possession of radium or a roentgen ray outfit is no more of a guarantee of skill or fitness for irradiation treatment than is the possession of a set of surgical instruments a guarantee of fitness for surgical treatment. It is just as important, perhaps even more so, for the radiotherapist to know something of the sensitiveness of the normal structures, the sensitiveness of neoplastic cells, and the usual clinical progress of the various types of neoplasms and allied conditions, as it is to know the pure physics of depth dose determination. By careful observations of the clinical course and written records containing repeated physical and laboratory examinations, we will eventually establish the true value of our recent progress in the physics of radiation therapy as applied to the patient. The radiotherapist who can make an accurate diagnosis and give a reliable prognosis will soon acquire a place of dignity among his fellow practitioners of medicine.

Though the use of radium and roentgen rays plays an important part in the therapy of malignant conditions, we must not forget that its value is even more definite and lasting in a large number of benign neoplasms and other chronic pathological conditions.

*Read at meeting of Section on Internal Medicine of the Bronx County Medical Society, March 22nd, 1926.

In the practical treatment of malignant conditions with radiation there are important factors to be kept in mind which necessitate the very closest co-operation of the surgeon, pathologist and radiation therapist. The pathology must be interpreted into terms of radiosensitiveness. The proper area or areas for irradiation must be accurately determined and the normal tissues must be protected in every way possible so as not to break down the natural body resistance through the destruction of continuity of normal tissue stroma, intra and peri-tumoral cellular infiltration, and the formed elements of the blood, which make up the triumvirate of tissue defenders, which must be conserved and stimulated. The required dose of radiation must be placed in that part of the growth where the active proliferation is taking place to stimulate normal tissue resistance to the invading neoplasia and obliterate the blood vessels and lymph spaces.

Though we know the reactions to radiation are not only qualitative but quantitative, nevertheless there has not and probably will never be established a standard carcinoma or sarcoma dose, since no two growths have identically the same cell structure or surrounding normal tissue stroma permitting identical reaction.

Our present knowledge of radiation effects does not permit of accurate deductions as to what type of changes in tumor tissues may be expected to follow a given type of radiation. The biological response of tissues to radiation depends upon numerous factors which vary under different conditions and frequently under similar conditions, so that a rigid histo-radiological classification is therefore impossible.

It is well known that structural characteristics of the tumor cells are of the greatest importance in determining the dosage required to produce the biological response to radiation. Bergonie and Tribondeau have shown that the more embryonal or undifferentiated the type of cell, the greater is its radiosusceptibility, and conversely, the more adult or specialized the cell, the greater is its radioresistance. The transitional type of cell is distinctly more radiosensitive than the squamous cell type and responds to smaller doses of radiation.

Among the important factors which influence tissue reaction in radiation, are the age of the patient, his general physical condition, the duration and condition of the lesion when radiation was first employed, and of particular importance is the presence of infection in tissues exposed to radiation. It has been observed that instances in which nodes had been incised, either in an attempt at partial removal or at biopsy, these cases responded very poorly to radiation.

The stimulating effect of infection upon tumor growth and the unfavorable radiation regression of infected tumors are well established clinical facts. There

is also histological proof of the lack of response of tumor cells to radiation in the presence of infection. Radiation regression of the tumor was most effective when associated with favorable reaction in the adjacent tissues, and least effective when this reaction was missing.

Physical Characteristics of Radium

Radium is an elementary body with an atomic weight of 226.4. Its so-called radioactivity is due to the fact that it constantly emits three kinds of invisible rays, alpha, beta and gamma rays, of which the two latter are employed in therapy. These rays are emitted in the course of the disintegration of the atom of radium. The radium element emits only an alpha ray and is thus transformed into "radium emanation," or "radon," which is also an elementary body, but has the structure of a heavy gas, the atomic weight of which is 222.4 that is four (the atomic weight of helium or the alpha particle) less than the atomic weight of radium. Radium emanation also emits only alpha particles and is then disintegrated into a series of new elementary bodies, so-called Radium A, Radium B and Radium C, which are solid bodies. Only the latter two substances (Radium B and Radium C) emit beta and gamma rays and have a therapeutic value. Consequently, for purposes of therapy the results will be identical, whether radium salts or radium emanation is the source of radioactivity. They will both have to disintegrate into Radium C before they can be employed.

Since it takes the radium element about 1,700 years to lose half of its amount through disintegration, it is obvious what a small fraction of it changes into radium emanation during each unit of time. The first advantage of the latter substance over the radium salt is thus evident, it may be concentrated into smaller space.

After the emanation is drawn off into a capillary tube, three and one-half hours later, when a sufficient amount of radium emanation has changed into radium A, B, and C, and the gamma ray activity within the capillaries reaches its equilibrium, the contents of the tubes are measured by the aid of an electroscope or galvanometer type of measuring apparatus. The principle of the measurement is based on the fact that the gamma rays of radium ionize the air within the ionization chamber of the apparatus and the intensity of this ionization is commensurate with the quantity of the gamma rays of radium. This indirect method is the only one at our command to measure either the quantity of radium salts or radium emanation. The unit of measure for radium emanation is one millicurie, which means the amount of gamma rays equal to an amount emitted by one milligram of radium element.

The effects produced by gamma radiation from radium are analagous to those produced by roentgen ray from a high voltage apparatus. The roentgen apparatus capable of producing such a pene-

trating ray is the one built to deliver 200,000 volts with filtration of ½ to 1 mm. copper plus 1 mm. aluminum, 4 milliamperes of current, at a distance of 50 cm. from the tube to the skin of the patient and a portal of entry measuring 15 cm. by 15 cm. In general, the roentgen ray is used in preference to radium, when a large surface of the body is to be treated, while radium is preferred for conditions located in body cavities or on small lesions.

BACTERIAL ACTION

Experiments indicate that the alpha and beta rays of radium are capable of arresting and if of sufficient intensity, of stopping the growth of cultures of various bacilli. It is generally conceded that the alpha and beta rays are definitely germicidal, but the gamma rays have no such properties. No definite evidence of such action has been proven as due directly to the roentgen ray. The emanations affect only the ability of the organisms to divide and do not influence other manifestations of vitality, including motility.

MORPHOLOGIC CHANGES

The effects produced by irradiation upon the skin are inflammatory in character, varying from a mild erythema followed by tanning of the skin, to ulceration and necrosis, the degree depending upon the amount used and upon the length of exposure. The earliest changes are dilatation and engorgement of the small vessels of the papillary part of the corium, followed by degeneration and irregular proliferation of the vascular endothelium, producing an obliterating endarteritis of the smaller vessels and later an infiltration by leucocytes with degenerative changes in the deepest layers of the epidermis. Falling out of hair, degenerative changes and sometimes complete destruction also occur in the sebaceous and sweat glands.

PHYSIOLOGICAL AND PATHOLOGICAL EFFECTS

Gastro-Intestinal Tract: The effects upon the mucosa and glands of the gastro-intestinal tract are destructive, and similarly are its effects upon the liver, pancreas, kidneys, adrenals and salivary glands. The degree of destruction depends upon the quality and quantity of radiation.

Hematopoeitic System: The spleen, bone marrow and lymphatic tissue show extreme sensitiveness to radiation. The spleen is much more susceptible than the bone marrow to irradiation. They show diminution of lymphocytes and an increase in amount of connective tissue. Bone marrow shows almost complete disappearance of cellular elements. Normal lymphoid tissue was observed to resist large doses of radiation. A peculiar lymphoid hyperplasia occurs, the nodes become enlarged, the lymph follicles prominent and the germinal centers contain numerous mitotic figures.

Circulatory System: Radiation results in three fairly definite reactions in the

circulatory system. (1) On blood elements: The erythrocytes are not markedly sensitive. Sometimes there is an increase in hemoglobin and red cells though as a rule there is no change at all after small or moderate doses. However, prolonged exposure to radiation may cause a diminution in red cells. The leucocytes may show a transient increase, but general effect of prolonged exposure is a diminution in the total number of white cells. The lymphocytes appear to be the most sensitive of the white cells to the rays. The bleeding time has been shortened, and an increase in blood platelets has been observed. (2) On blood chemistry: The cholesterin content of the blood remains unaltered after irradiation. In a study of the blood sugar regulation following roentgen treatment on 24 cases, there was no constant relationship between the decrease in lymphocytes and the blood sugar level. It appears that blood sugar decreases or increases immediately after irradiation, apart from individual characteristics, and is dependent upon the type and quantity of the radiation administered. Most of the decreases occur in cases receiving a so-called carcinoma dose. (3) Effects upon the heart and circulation: These may be manifested by some diminution in blood pressure, which is due to the destructive effect on the vaso-constrictor substances produced by the suprarenals.

Endocrine Glands: The thymus undergoes atrophy as a result of irradiation. The normal thyroid shows little effect after irradiation, but radiation has marked effects upon the symptoms associated with pathological conditions of the thyroid.

Radiation Affects Metabolism. In general there is an increase of the total nitrogen output in the urine after irradiation. The increase in uric acid output is most marked in the postradiation periods of leukemia patients. The increase of uric acid is interpreted as being due to the decomposition of the nucleoproteins. This view seems to be substantiated by observations that the total phosphorous elimination is also increased under similar conditions. The effects of radiation on the inorganic metabolism was to show a marked retention of the chlorides.

Nervous System: Nerve cells are not sensitive to radiation. Whatever effects occur are due to circulatory disturbances consequent upon the injury to the small vessels.

The Eye: The retina is most affected, and destructive effects upon it are mainly due to gamma rays. Lens and muscle fibres are tissues least affected.

Generative System: Prolonged exposure to radiation will cause destruction of the epithelial cells lining the seminiferous tubules, atrophy of the testis and sterility. It has similar destructive effects upon the ovaries, causing almost complete disappearance of the Graafian follicles. The most sensitive parts of the ovary are the maturing and matured follicles.

Physiologic Effects of Radiation produce a general sense of well-being when given in moderate dosage. In some it is followed by a mild reaction consisting of nausea, vomiting and slight discomfort.

Elimination of Radium is mostly by the intestine, though to some extent in the urine and some by the lungs.

THE VALUE OF RADIATION IN CLINICAL MEDICINE

Hodgkin's lymphoma, lymphosarcoma and the leukemias constitute an interesting group of conditions which are characterized by symptoms, physical signs and laboratory evidences, due to pathology in the blood and lymph glandular systems. Clinical observations and a study of the pathological reports in these conditions have impressed me with the view taken by other observers (Mueller, Yamasaki, Karsner and Welch) that they are all due to the same underlying pathology, and each is but another phase of the same process. I have seen cases admitted to the hospital with physical and laboratory evidences of the existence of Hodgkin's lymphoma, which later in the course of the disease, show by biopsy to be lymphosarcoma. Similarly, I have seen a patient with clinical symptoms and pathological report of lymphosarcoma, terminate with a blood picture of leukemia. Analagous to the types of carcinoma such as squamous cell and transitional cell types, each showing differences in degrees of response to radiation, there probably exists a group of malignant conditions of the blood and lymph glandular systems, presenting different types, depending upon the predominance of cells present.

In general, patients with Hodgkin's lymphoma, lymphosarcoma or leukemia present sufficient clinical manifestations to diagnose or suspect the presence of the conditions. However, there is a group of patients which present symptoms almost entirely referable to the nervous system and a diagnosis is made of a neurological condition. The subsequent clinical course or autopsy findings show pathology of Hodgkin's lymphoma or lymphosarcoma. It is not uncommon to see a diagnosis made of spinal cord tumor, as I saw several months ago, and at autopsy show diffuse infiltration of the spinal cord with malignant lymphoma. I have also seen a case recently in which on account of progressive dysphagia and loss in weight a gastrostomy was performed, and examination showed pathological report of Hodgkin's lymphoma. It is therefore important to remember the possibility of the presence of Hodgkin's lymphoma or lymphosarcoma with clinical signs and symptoms entirely neurological. Surgical procedure in such cases is entirely useless, while radiation has produced marked improvement in some of these cases.

The prognosis in these conditions, as far as cure is concerned is hopeless. Medical and surgical therapy are not very encouraging. Radiation therapy is the only procedure of definite value in producing regression, alleviation of symp-

toms and prolongation of life for several months or years. Such cases under proper hygienic, tonic, and radiation therapy, with continued clinical observations, can be made comfortable and even controlled sufficiently to allow the individual to be up and about and attend to light duties.

The response to radiation is most marked and occurs earlier in lymphosarcoma than in Hodgkin's lymphoma. In the former there is usually evidence of regression within seven to ten days, while in the latter it may not occur before five to six weeks. The chronic leukemias respond by diminution in white cell count, and in the size of the spleen and lymph glands, with improvement in general symptoms. In lymphatic leukemia the remission is not as marked as in myelogenous leukemia. The white blood cells will be markedly reduced and sometimes the lymphatic glands return to normal size.

In obscure cases where the diagnosis is uncertain, a careful history of the clinical course and interpretation of the physical signs may be of more value than a biopsy, which I have repeatedly seen reported as suspicious but not conclusive. The therapeutic radiation test should be employed in obscure or doubtful cases as an aid in diagnosis. It is a harmless procedure when properly applied, and will often be of more conclusive value than the biopsy report.

Although in general these conditions will respond to roentgen ray therapy, there occasionally occurs a case which proves to be resistant to roentgen therapy, but will show sensitiveness to radium therapy, as shown by a brief report of the following case which I now have under observation.

CASE REPORT

S. S., male, age 43, Russian, was referred to me on May 4th, 1925 (about ten months ago), complaining of tumor masses in both sides of the neck, more marked on the right side.

Past History—Treated for furuncles in the neck twelve years ago by local therapy and vaccine injections and cured. Operated five years ago for gastric ulcer, with no improvement of symptoms until two years later after dietetic treatment.

Present Illness—Onset was gradual, about three years ago, with a painless swelling in the right side of the neck. He consulted a physician who attributed the condition to bad teeth, referred him to a dentist, who extracted an abscessed tooth. The mass in the neck did not subside, and he consulted several physicians who gave various treatments without improvement. The large mass and several smaller ones continued to increase in size until April, 1924 (twenty-two months ago) when he was operated upon, and the surgeon reported presence of broken down and infected glands. This was followed by local treatment consisting of heat and high frequency, for a period of three months, during which time the masses continued to increase in size.

About six months after the operation, the masses had grown to about twice the size of the swelling present at time of operation, and was then referred for roentgen therapy. After one treatment there was slight diminution in size, and after consulting another physician who gave him 12 roentgen treatments, one a week, the masses continued to increase in size, was then referred to me (ten months ago.)

Physical Examination—Patient is an adult male, in good general condition. Inspection of neck revealed masses so large that patient was unable to wear his usual size collar. Several enlarged glands were palpable in left axilla and both inguinal regions. The remainder of examination, including blood structure and blood Wasserman was negative, except for roentgenogram of chest which showed increased hilus markings and peri-bronchial thickening.

Progress and Treatment—A series of high voltage roentgen therapy treatments were administered to the neck with no response whatsoever. It was not until I applied radium to the masses in his neck that I obtained a marked diminution in size and improvement of the condition.

Conclusion—This case shows the apparent effect of surgical procedure in a patient with Hodgkin's lymphoma upon subsequent treatment by roentgen ray, and also indicates the sensitiveness to radium radiation when roentgen sensitiveness was absent.

Pernicious Anemia has been treated by applications of radium to the spleen, with amelioration of symptoms, improvement in the blood picture and prolongation of life for several months.

Erythremia has been successfully treated with radium applications to the spleen and blood-producing apparatus. The blood returned nearly or quite nearly to normal, and the purpura-like changes in the skin and mucosae vanished. The radium acts on the constant hyperplasia of the blood-producing apparatus, and there are no general disturbances afterward, such as often follow roentgen treatment, which has also produced a return of blood to normal. In the roentgen therapy of these cases, treatments were only given to the skeleton, long bones, pelvis, spine, scapulae, sternum, and ribs, but not to the spleen.

There are some conditions such as the hemorrhagic maladies and so-called Banti's disease, of which the etiology is obscure and unknown, and in which splenectomy is occasionally considered as a therapeutic procedure. It is in such cases that I believe radiation therapy should be given a fair trial, if there is to be no apparent loss by delay of several weeks so that a reasonable time can elapse to accomplish the effects.

In the *American Journal of Obstetrics and Gynecology,* for August, 1924, Dr. Goldmark and myself reported a case of "Post-partum Purpura Hemorrhagica, treated by Radium and Deep Roentgen Therapy." The patient was 28 years of age, para 1, admitted to the Lebanon Hospital about four years ago, with a

history of post-partum vaginal bleeding, bleeding from the gums, general weakness, etc. The diagnosis was made and confirmed by the blood examination which showed marked diminution in number of blood platelets, prolonged bleeding time and no retraction of the blood clot. After all possible therapeutic measures were tried, including medications of glandular extracts, transfusion and packing the vagina, the bleeding could not be controlled, and the patient was going progressively downhill, until her hemoglobin was as low as 18 per cent. As a last resort, radiation therapy was instituted. About four weeks after first radium treatment, she commenced to show signs of improvement, which continued until her discharge from the hospital. She is alive and well today, now four years since onset, and examination of her blood on February 20th, 1926, shows a normal blood picture.

A study of the cases of purpura hemorrhagica in the literature shows that this particular type of purpura occuring post-partum has been invarably fatal. This case has apparently been benefited by radiation therapy and suggests the advisability of its use in such cases.

In Banti's Disease, amongst those who report favorable results by radiation is Gulland, who reports satisfactory results in the radium treatment of this condition. The spleen became smaller and the patients improved so much that splenectomy was not required. The following is a brief history of a case I now have under observation:

CASE REPORT

L. E., female, age 24, married, was seen by Dr. Nellis B. Foster on July 21, 1925, with a history "beginning four to five days post-partum (six weeks ago) felt sense of pressure and dragging on left side of abdomen. Had one slight epistaxis five or six months ago, and again just before delivery. Has not noticed being jaundiced. Following an attack of influenza in 1918, was told she had an enlarged spleen. During pregnancy felt well, but began having severe headaches after childbirth. Since then feels weak and dizzy, has fainting spells. Takes great amount of nourishment and sleeps a great deal."

Physical Examination—Physical and fluoroscopic examination of the chest was negative except for the abdomen which showed mass in splenic region, lower border extending nine and one-half inches below costal margin, and two inches to the right of midline, at level of umbilicus; line between costal (tenth) tip and right anterior superior spine divides mass in half.

Laboratory Examination—Blood examination by Dr. N. Rosenthal showed a white blood count of 2,500, and blood platelets 70,000. Diagnosis from physical examination and blood picture was Banti's disease.

Progress and Treatment—Splenectomy was advised but patient refused and was then referred to me for radiation therapy. She was given small, frequent radium applications to the spleen, and

several deep roentgen treatments to the spleen, with constant careful observations and examinations of the clinical course. There was a gradual improvement in symptoms until about one month after therapy was instituted, at which time subjectively the improvement was marked.

Examination by Dr. Foster on December 29th, 1925, showed the patient in good general condition, no symptoms, and diminution of two inches in size of the spleen. Blood examination showed increase in blood platelets to 160,000, but leukopenia is still present.

Examination of the patient on February 17th, 1926, showed her to be in good general condition and complaining of no sympoms.

The radiation apparently has benefited this patient for the time being and further observations and study will eventually determine the real value of this method of therapy.

In hyperthyroidism radiation therapy will probably give as many permanent cures as surgery. The majority of the cases of hyperthyroidism and exopthalmic goitre will respond to radiation by showing a disappearance of symptoms and diminution in basal metabolism rate. The colloid, cystic, or simple thyroid enlargement should not be subjected to radiation. A careful record of the clinical course and metabolic determinations is indispensable as a guide in the treatment of thyroid hyperfunction. A patient under radiation therapy should have a basal metabolism determination made every three months. Patients with hyperthyroidism should first be given a trial with radiation therapy and be operated upon only if the disease fails to respond to the treatment. The advantages of radiation therapy are that there is no mortality, that the patients will submit to this method of treatment at a much earlier stage of the disease than to operation, and the method is applicable to inoperable and to postoperative cases.

There is a condition of the thyroid known as "Riedel's Struma," or "Woody Thyroiditis," which is not very common, but responds to radiation therapy. The thyroid in this condition presents a diffuse, hard nodular enlargement, very closely resembling a malignant thyroid. In carcinoma of the thyroid, radiation can accomplish a good deal in retarding further growth and producing alleviation of symptoms.

RADIATION IN NEUROLOGY

Gliomata are the most frequent of all intracranial neoplasms. These tumors arise from cells of the brain tissue proper, and represent about 40 per cent of the total of brain tumors. When such tumors are found inoperable, after a decompression is done, deep radiation directed to the site of the lesion has often caused palliation of symptoms and prolongation of useful life for a very considerable period.

Pituitary tumors consist of two distinct types, the adenomas which repre-

sent 20 per cent, and the suprasellar cysts which constitute about 5 per cent of all intracranial growths. In the adenoma group, radiation has produced marked amelioration of symptoms, and may be given a trial in such cases, when careful and frequent examinations of the visual fields can be done. Recently good results have been reported by directly embedding radium emanation into the pituitary body through the posterior nares with undoubted proof of the tumors being arrested or probably destroyed. In general radiation is worthy of trial in inoperable intracranial neoplasms, with the aim of palliation and prolongation of life in view.

In some cases of *syringomyelia*, improvement in the abnormal sensibility after three or four exposures to radiation has been reported, which has been explained as being due to the phagocytosis induced as well as to the destruction of the gliomatous tissue.

RADIATION IN SURGERY

In surgery radiation has a definite part to play in the eradication of new growths.

Carcinoma of the Breast presents one of the most important problems in the management of malignancy. The proper decision as to procedure when a patient presents herself with a lump in the breast is often most difficult even in the hands of an experienced surgeon. The first and most important question to decide is whether it is a malignant or benign neoplasm. This may not be possible in some instances, and in cases of uncertainty, it is better to treat such as malignant. When a freely movable encapsulated mass, apparently benign, exists, it should be removed surgically. Where there are present signs indicative of malignancy, radical surgical procedure should be instituted. There is no further question as to procedure in a patient with a lump in the breast, with suspicion of malignancy. The therapy is surgical, radical or conservative to be decided upon by the surgeon aided if necessary by pathological examination of a frozen section.

Though we even at this stage in medicine occasionally see a lump in the breast treated by local medication, it is practically universally known that such cases require surgical consultation without delay. When a breast neoplasm is considered malignant the next step for the surgeon to decide is whether the case is operable or inoperable. Many cases are submitted to radical surgery with disastrous results, whereas more conservative procedure might have controlled the condition for months or even years. To decide upon whether a case is operable or inoperable requires a careful physical examination of the patient, to determine the presence of glandular or intrathoracic metastases, or involvement of other organs. Roentgenograms of the chest, pelvis and lumbar spine are absolutely essential for a complete examination. Where such extensions or metastases occur, radical surgery is usually contra-indicated, and a great deal can be

done in such cases by conservative surgery and radiotherapy. There is a type of carcinoma of the breast described by Lee as inflammatory in type, which usually occurs in women between 35 and 45 years, characterized by a hard mass, infiltrating, adherent at times to the overlying skin, presenting redness and increased local heat, slight pain, with a fairly distinct margin of demarcation of the redness. This appearance is due to the permeation of the lymphatics in the skin with carcinoma cells. Such a case if treated surgically is soon followed by local recurrences or metastases, and early death. Radiation therapy in such cases has produced control of the growth, alleviation of symptoms and prolongation of life for months or several years. Such cases occur occasionally, are not recognized, and radical surgery instituted with early fatal result.

Carcinoma of the breast should be considered inoperable when one or more of the following conditions are present:

(1) Inflammatory carcinoma.

(2) Complicated by pregnancy.

(3) Marked supra-clavicular fullness.

(4) Metastases to bones.

(5) Recurrent, diffuse, subcutaneous nodules in the operative field.

(6) Single, fixed recurrences to the chest wall.

(7) The presence of axillary modes in the same side, with extension well up beneath the clavicle.

(8) Well marked fulness of the supraclavicular fossa of the involved side. Palpable nodes may not be present at this time, but they invariably develop later.

(9) Involved nodes present in the opposite axilla.

(10) Evidence of involvement of the opposite breast.

(11) Intrathoracic metastases.

(12) Any recurrence that follows operation on an inflammatory carcinoma of the breast.

(13) Metastases to distant organs.

Prophylaxis in carcinoma of the breast: A large number of patients with carcinoma of the breast give a history of having had chronic mastitis or abscess, which apparently have acted in some as a predisposing factor. It has been shown experimentally in mice (by Bagg) that in a series of animals in whom the drainage of the mammary ducts was blocked mechanically by tying them off, carcinoma in those mice was produced by inoculation, while in another group, where drainage was not interfered with, inoculation with malignant cells failed to produce any tumor. It seems, therefore, from clinical and experimental evidence, that interference with drainage of the breast is a possible factor in the development of malignant neoplasia. The proper hygiene of the breast as prophylaxis in carcinoma of the breast, may possibly be as important as the proper hygiene of of the mouth in the prophylaxis of intra-oral cancer. This essentially means to

advise measures which may prevent the occurrence of chronic mastitis and abscess formation by allowing the breast to function and drain properly. Anomalies of the nipple, such as inversion, which interfere with the proper drainage of the breast, should be corrected, and women bearing children should allow the breast to perform its normal function by nursing their infants, thereby avoiding obstruction to the drainage of the breast.

Radiation therapy in mammary cancer: The final results depend upon the type of cancer, age of the patient, the stage and rapidity of growth, extent of metastases, regions invaded, the physical resistance of the patient, duration of the symptoms before operation, by the period of time that elapsed between operation and radiation, and by the duration of the recurrence. Analysis indicate very clearly the great advantage of radiation therapy in carcinoma of the breast, not only as an adjunct to surgery, but in the hopeless recurrent and inoperable cases.

Ewing believes that 4.5 per cent for five year cures represent the average success obtained by surgical treatment. Pfahler and Widman in a statistical study of radiation therapy in 801 cases of carcinoma of the breast, all cases together, early and late, operable and advanced, inoperable and recurrent, showed 50 per cent were alive three years, and 27 per cent alive five years.

Seuffert, Schmitz, Pfahler and Widman show 36, 42 and 46 per cent, respectively, in the radiation treatment of cases showing gland involvement.

With so much clinical evidence of the value of radiation in advanced cases, it only seems fair to assume that radiation therapy applied early should be of even more value.

Lee and Herendeen have evaluated the results of preoperative and postoperative irradiation as compared with surgery alone. They found excluding relatively benign cases, in all of which the patients were alive and well, that of the patients receiving preoperative and postoperative irradiation, 46 per cent were alive and well three years after radical mastectomy, of the patients who had received only postoperative irradiation, 33 per cent were alive and well, while of those treated by surgery alone, 21 per cent remained free from disease. This suggests the advisability of giving preoperative irradiation in all cases where possible.

The prognosis in carcinoma of the breast, as in any other location of the body, depends upon its early recognition and early treatment. It is reasonable to assume that the patient is likely to have the longest duration of life if radiation therapy is given about three to four weeks before operation, and again postoperatively about three to four weeks after operation. Of great importance also is to have the patient under observation, and appear for physical examination at regular intervals, and repeat the series where indications arise.

Inasmuch as pulmonary and skeletal metastases is rather common, I consider it good procedure to give postoperative irradiation to chest and pelvis in all breast cases, when possible. In women who have not reached the menopause, the radiation to the pelvis is advisable for two reasons, first to affect any malignant cells which may exist in the bony skeleton and second by producing an artificial menopause, or sterility, which is another advantage, because it is known that pregnancy complicating cancer tends to hasten a fatal outcome.

Radiation has not only proven its value, but its necessity in mammary cancer. The best results will be obtained by co-operation of the surgeon, internist and radiotherapist, before any form of therapy is instituted.

Carcinoma of the lung within the past few years has been apparently on the increase, but this is perhaps due to the fact that the condition is being suspected and diagnosed more frequently. Surgical procedures do not show any good results, while radiation therapy has produced amelioration of symptoms, and deep roentgen therapy should therefore be given a trial in such cases. The best palliative result I have seen was in an adult male about 65 years of age, referred to me about three years ago by Dr. H. J. Seiff, with a history of cough, bloody and purulent expectoration, frequent hemoptyses, anorexia, loss in weight, pains in the chest, causing him to be awake nights and which later on were scarcely benefited by opiates. Physical examination and roentgenograms of the chest showed such signs as to warrant the diagnosis of carcinoma by excellent clinicians in the city. He was given a series of deep roentgen treatments, in divided doses with considerable improvement, so that practically all his symptoms disappeared, appetite improved, gained in weight, and required no opiates. Roentgenograms of chest showed diminution in extent of the lesion. The patient continued under our observation for about a year, then failed to appear, but my repeated inquiries from the family physician informed me that he was doing well for about two and a half years, until a few months ago he had a sudden pulmonary hemorrhage which proved fatal.

Deep roentgen therapy is indicated in primary and also in metastatic malignancies of the chest. In the treatment of metastatic sarcomata, the morphological and histogenetic structure of the tumor play a very important part. Best results are obtained in the embryonal type of sarcomatas, (angio-sarcomata). In the treatment of metastatic carcinomata, the circumscribed mediastinal metastases and infiltrating metastases respond well to treatment, especially when the primary carcinoma is of the differentiated type.

Radiation in carcinoma of the gastro-intestinal tract. Surgical results in carcinoma of the stomach, even in the early cases are not very encouraging. Palliative results are obtained by radiation in

some cases in controlling many unpleasant symptoms and checking temporarily the extension of the disease itself.

Carcinoma of the rectum if recognized early and treated by surgery may show good results. However, the majority of the cases are recognized at a stage beyond hope for cure by radical surgery. An analysis and study which I have made of 91 cases over a period of ten years, admitted to Montefiore Hospital, which is published in the *Journal of Surgery, Gynecology and Obstetrics,* July, 1926, has shown that the average duration of these cases was about two years, whether treated by surgery or without surgery. This study has also shown that in carcinoma of the rectum palliation of the symptoms, shrinkage of tumor, and prolongation of life can be obtained by radium therapy properly applied locally and deep therapy to the pelvis for a period of several months to even four years, without any surgical procedure.

The best surgical statistics under the best conditions at present are 35 per cent cure after three year period. Radiation therapy and palliative surgery, such as colostomy, are the best therapeutic measures we have at present in the management of the majority of the cases of carcinoma of the rectum.

Radiation in bone tumors. Among the benign neoplasms occurring in bone is the so-called "giant cell tumor," which is usually treated successfully by surgery. However, several such tumors have been known to show regresson under radiation therapy, and in some instances where operation is inadvisable, they should be given the benefit of this type of therapy.

The periosteal and osteogenic sarcomata are usually very malignant, and results with surgery alone are discouraging. Better results can probably be hoped for by a combination of radiation and surgery.

There is a malignant type of bone tumor which is not at all benefited by surgery, an endothelial myeloma or so-called "Ewing tumor." This growth nearly always involves the shaft, invades the whole bone, cortex and all, does not produce bone, and consists of small round cells with no tendency to formation of intercellular substance, and shows rapid regression under radiation. This type corresponds to the periosteal or central round cell sarcoma of Gross, but is considered by Ewing to be an endothelioma. Roentgenogram shows a tumor of the shaft in which the bone has a striated appearance as if the disease was invading the marrow spaces and separating the lamallae, thus swelling and widening the whole shaft and cortex. Roentgen radiation will cause at least temporary disappearance of the tumor. Metastases occur in the lungs and often show also in the skull and other bones.

Carcinoma occurring in bone is practically always metastatic, and the most common primary source being in the

breast, prostate, thyroid, and kidney. Palliation of symptoms with new bone production has been accomplished by radiation in these cases.

RADIATION IN GYNECOLOGY

In the practice of gynecology radiation therapy is probably of more definite and permanent value than in any other branch of medicine. It is indicated in the following conditions:

(1) Fibroid tumors of the uterus, except the pedunculated, submucous type, or those showing degeneration.

(2) Functional menorrhagia and metrorrhagia without evidence of gross pathology and most commonly observed in the fourth decade.

(3) Menorrhagia or metrorrhagia due to metritis or endometritis of hypertrophic of polypoid nature. An active or latent infection in the pelvis is usually considered a contra-indication to treatment, as an old quiescent infection may be converted into an active process by radiation therapy. Best results in radiation of gynecological conditions can only be obtained by co-operation between gynecologist and radiotherapist. The most favorable time for treatment is soon after a menstrual period.

The contra-indications to irradiation of fibroid tumors of the uterus are:

(1) Tumors larger in size than four months' pregnant uterus.

(2) Tumors complicated by adnexal disease either neoplastic or inflammatory.

(3) Tumors causing pressure symptoms, which respond too slowly to irradiation to give quick relief.

(4) Cachexia out of proportion to the blood loss, which is suggestive of necrosis of the tumor.

(5) Large submucous tumors.

(6) Rapid growth of the tumor.

(7) Patients under 35 years of age, except in occasional cases. Carcinoma of the body of the uterus is usually best treated by hysterectomy with pre and postoperative irradiation.

In *carcinoma of the cervix,* statistics for early cases are equally as good with radiation as with surgery, with the advantage of practically no mortality by radiation therapy. In the borderline and the inoperable and far advanced cases, radiation produces marked regression of the tumor, alleviation of symptoms and prolongation of life for months or several years.

The treatment for *carcinoma of the ovary* is as yet unsatisfactory. It is possible that by some combined procedure of surgery and radiotherapy, we might be able to accomplish something. A study of 15 cases of carcinoma of the ovary in the Montefiore Hospital during a period of ten years, from 1914 to 1923 inclusive, seemed to indicate that most of the cases (eleven out of fifteen), presented ascites as a prominent symptom, that most of the patents living over twelve months were past the age of 40, and there was a longer total duration in the

patients who were about 60 years of age or older. The last observation possibly suggests a better prognosis as to number of months in the older patients.

The average duration of patients with carcinoma of the ovary during 1914 to 1921, inclusive, with no therapy was twelve months. The average duration in 1922 to 1923 when radiation therapy was given, was twenty-three months, which apparently indicates some value in radiation.

The following is a brief history of a case I now have under observation: J. E., female, married, age 28, referred to me August 24th, 1925 (about seven months ago. Married four years, one child, 3 years old, alive and well. No miscarriages. Menstruation started at 13, regular. Medical and surgical history negative.

Present illness—After birth of her child, three years ago, she noticed her bowels became markedly constipated. This condition improved after one year until one year ago then became constipated again and she has had to take cathartics since. Commenced to lose in weight January 1925, lost about 20 pounds in about a year. Had no pain, but on account of constipation consulted a physician who upon examination diagnosed a tumor in abdomen, which was confirmed by several physicians, and finally referred by Dr. Rongy to Lebanon Hospital for operation.

Physical examination—The positive findings were moderate pallor, and a hard mass palpable in the supra-pubic region of abdomen. On vaginal examination a hard irregular mass was also palpable in the posterior cul-de-sac. On rectal examination the mass was also palpable.

Operative findings—Papillary masses were observed on the anterior surface of uterus, involving bladder wall, metastases in the glands and peritoneum, also a large hard retro-peritoneal mass. Pathological specimen obtained at operation, and no further attempt made at removal.

Diagnosis—Diagnosis made and confirmed by section was papillary adenocarcinoma of left ovary with metastases.

Course and Treatment—About six weeks after operation, patient was referred to me for deep roentgen therapy, and received a full course in the pelvis. Examination by Dr. Rongy, about two months after therapy was instituted, showed patient in good condition, gaining in weight, appetite good, and abdominal and vaginal examinations showed diminution in size of tumor masses. Inquiry from her family physician about two weeks ago, informed me that the patient is in comparative comfort and at present symptomless. Radiation has apparently benefited this patient, and it is our duty to give these patients a chance, where no other procedure is of any benefit.

RADIATION IN GENITO-URINARY SURGERY

In genito-urinary surgery, radiation combined with surgery can accomplish a

good deal in amelioration of symptoms and control of growth, in carcinoma of the bladder, prostate and seminal vesicles. In carcinoma of the prostate radiation has procured symptomatic relief and return of urination by use of radium in 75 per cent of cases, and relief of pain in the back, which is usually due to metastases, in 50 per cent of cases. Three cases were reported free of symptoms and growth for over four years.

The majority of the tumors occurring in the testicle are teratomata, and are malignant. Surgical results in these growths are not very encouraging. A large percentage of these teratomatas of the testis, which are of embryonal type, respond very readily to radiation. It is, therefore, advisable and better to irradiate most tumors of the testicle even where surgical procedure may be considered later on. Diminution in tumor and alleviation of symptoms can be obtained in the majority of these cases by radiation alone.

RADIATION IN DERMATOLOGY

Radium is the agent of choice in epitheliomas of the skin, keloids and vascular naevi. Small epitheliomas about the eye, nose and mouth, show fewer recurrences with radium.

RADIATION IN OPHTHAMOLOGY

In ophthalmology, radium is of distinct value in treating many benign affections of the eye. It is a specific in vernal conjunctivitis, trachoma and certain lid lesions. Radium offers less scarring, greater freedom from pain, less loss of time from work and more sightly results than surgery in many conditions about the eyes and head. In malignant neoplasms such as sarcoma of the orbit radiation therapy has accomplished some remarkable results where surgery was out of the question.

RADIATION IN OTOLARYNGOLOGY

In recurrent nasal polypi, radium is of distinct value in causing a shrinkage and destruction of the growths. In intraoral cancer, and malignant tumors involving the mucous membranes of the ear, nose and throat radiation locally and to the glands in the neck, combined with ligation of blood vessels when indicated, has produced marked regression of the growths.

It is remarkable what a large number of patients with Hodgkin's lymphoma or lymphosarcoma give a history of operation for removal of tonsils or nasal polypi. This suggests the importance of a careful and complete physical examination of every patient before advising any such operation on the nose and throat for removal of any hypertrophied lymphoid tissue. The absolute uselessness and harm from such unnecessary surgery is evident.

RADIATION IN PEDIATRICS

In pediatrics radiation is of value chiefly in the treatment of vascular naevi, children with thymic hyperfunction and asthma, pertussis, some cases of chronic

cough, with adenopathy, and tuberculosis adenitis.

CONCLUSIONS

(1) Radiation produces distinct tissue effects, knowledge of which enables therapy to be given on a more rational basis.

(2) It is just as important for the radiotherapist to have a knowledge of the pathology and clinical course of the diseases in medicine which respond to radiation, as it is for him to possess a set of charts of dosages and depth dose determinations.

(3) Radiotherapy is of distinct value in selected cases in practically all branches of clinical medicine.

(4) Though radiation therapy plays a very important part in the treatment of carcinoma and allied conditions, we must not forget that it is also of value in many benign conditions.

(5) Radiation should be used as a therapeutic test in certain selected cases where diagnosis is uncertain.

(6) Best results can only be obtained by the proper co-operation between surgeon, internst, pathologist, the various specialists and the radiotherapist.

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HYDROTHERAPY AMONG PHYSIOTHERAPISTS*

A PLEA FOR ITS MORE GENERAL USE

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HISTORY

WATER is one of the oldest remedies now in use by the medical profession. Hippocrates first expounded upon the use of water as a remedy in the treatment of disease. He correctly insisted that cold stimulates and warmth relaxes. Asclepiades cast aside all foliative medication and depended chiefly upon diet, exercise and baths.

A review of the history of hydrotherapy shows that this branch of therapeutics has had a very unique and interesting experience. There has been a long succession of popularity and desuetude which has been accorded to it by both the profession and the laity. Probably one very important factor in causing the pendulum to swing backward and forward so often has been its advocacy by such laymen as Priessnitz, in Germany, and the Reverend John Hancocke, in England. Their following, however, was chiefly among laymen. But to Professor Wilhelm Winternitz, an Austrian physician, belongs the credit of putting the use of water, externally as a remedy, on a scientific basis, and today hydrotherapy en-

*Read at the annual meeting of the American Academy of Physiotherapy.

joys a well deserved place among the other branches of physiotherapy. The prejudice which still exists against the use of cold water, the absence of hydrotherapy from the curriculum of our medical schools, the cost of the equipment and the difficulty of finding proper space for housing it and administering the treatments are all factors leading up to the present situation of the lack of facilities for this form of treatment in our hospitals and similar institutions.

RATIONALE

Let us consider for a moment the anatomical structure of the skin, with particular reference to its blood supply and innervation, before taking up the physiological effects and the rationale of the application of water to the external surface of the body, in health, as a basis for its use in disease.

The blood vessels of the skin are supplied with vigorous muscle coats which are capable of storing some of the energy supplied by the contractions of the heart muscle and in this manner maintain a more or less constant blood pressure. These capillary vessels form loops between the corium and the subcutaneous tissue, and increase or diminish in size as they become filled with blood, or are compressed by the papillae. This capacity for varying their size furnishes an important agency by which hydrotherapy may effect the circulation.

The nerve supply to the skin is very complex and of especial interest to the hydrotherapist. It consists of minute branches of both medulated and nonmedulated fibers from the efferent cerebral and spinal nerves. These delicate filaments form plexuses and fibrillary networks in the various layers of the dermis and end for the most part in minute button-shaped end plates. To this remarkable structure is due the extreme sensitiveness of the epidermal layer. It also furnishes a pathway by which hydrotherapy may affect the central nervous system.

By reason of the physical properties of water, it becomes a powerful agent for influencing the body functions.

First among these I would mention its capacity for gathering, absorbing and transmitting heat and cold. These properties are possessed by water in a high degree.

Second, its flexibility. The ability of water to undergo enormous physical changes as a result of variations in temperature is well known, and it is this property which gives to it such a wide range of effect, so great even as to destroy life at certain degrees.

Third, its fluidity makes it possible to vary greatly the form of application. The various forms of hydriatric procedures derive their technique and application from this property of water.

Fourth, the capacity of water to be influenced by varying degrees of pressure. This makes it possible to obtain by various mechanical contrivances varying degrees of mechanical effect, from the soothing, sedative effects, to those with enormous stimulating properties.

You will thus see that the chief effects of water applied to the external surface are thermic and mechanical.

The beneficial results obtained by the use of hydrotherapeutic procedures are accomplished through their effects upon the circulation of the blood, the respiration, body metabolism and the body temperature. Let us consider these separate items a little more in detail.

The Circulation. The action of hydrotherapeutic applications on the circulation is of two kinds; first, upon the distribution of the blood and upon the blood pressure; second, upon the composition of the blood. The first effect of a slight irritation of the skin is to cause hyperemia which is followed by an increased tone of the muscle walls of the blood vessels. If this irritation is intense and sufficiently prolonged relaxation and destruction of tissue follows. Besides this direct action upon the blood vessels of the skin there is an indirect or reflex action due to stimulation of the vasomotor centers in the medulla, through the irritation of the afferent vasomotor nerves. This increased muscular tone leads to a narrowing of the arterioles, with increased blood pressure, and in its turn to a more rapid heart action. Cold enhances, while heat lowers the tone of the muscle walls of the blood vessels.

Thirty years ago a great deal of work was done by Winternitz, Strasser, Thayer and others in inquiring into the effect of cold baths upon the composition of the blood in sickness and in health. The increase in the number of both the red and white cells in blood taken from the ear or fingertip is very marked following these cold applications, sometimes as great as from 1,000,000 to 1,800,000 red cells, and from 1,000 to 2,000 white cells. This increase in blood corpuscles is accounted for by several factors, namely, hyperemia, change in the distribution of the blood and the increased blood pressure. These figures do not show an actual increase in the number of blood cells, but a redistribution due to bringing more blood into the peripheral vessels.

The Respiration. The first effect of steping into a cold bath of any kind is to take a deep breath. After a cold shower, depending somewhat upon the temperature, there is considerable increase in the depth and frequency of the respirations which lasts for a considerable period. This heightened respiratory activity leads to an added consumption of oxygen and an increased elimination of carbon dioxide.

The Body Metabolism. The action of cold baths in relieving fatigue by increasing the metabolic processes and thereby the elimination of fatigue substances, such as the extractives, P_2O_5 and CO_2, has been exhaustively studied by Winternitz and his assistant, Alois Strasser. The increased capacity for work following these cold applications can be accounted for by this increase in metabolism and elimination.

The Temperature. All of us are familiar with the effect of cold baths upon the body temperature. While they are important, they are among the least essential results of the application of cold water to the body.

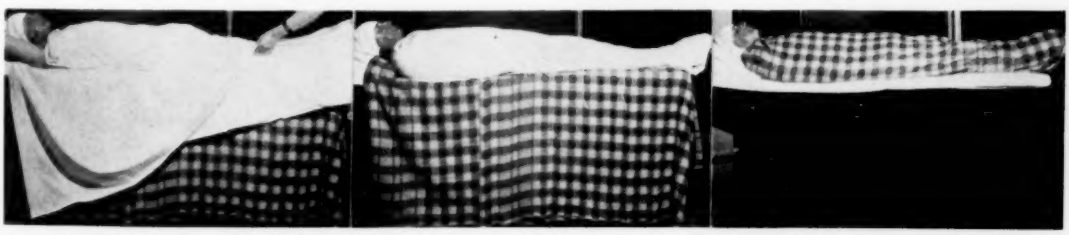
EQUIPMENT

For the successful practice of hydrotherapy an elaborate equipment is not absolutely essential, although a modern control table and such douche room accessories as a circular shower, a rain shower, full and sitz bath tubs, add greatly to the results obtained. It is quite possible to do very good work with such a simple outfit as a coarse linen sheet, two or three blankets, a foot tub and a pail of water. With these few simple articles one is able to give dry packs, as a warming procedure preliminary to the tonic sheet bath; wet packs, lightly covered, as a tonic measure, or heavily covered for heating purposes where it is necessary to increase the elimination in metabolic disturbances; and drip sheet baths with friction as a tonic measure.

I have prepared a few illustrations to show apparatus and demonstrate the technique of a few of the more important hydriatric applications.

Body Pack. This is a very valuable procedure for purposes of heating the body preliminary to some forms of hydrotherapeutic procedure, and can be made use of in the absence of the electric light cabinet or large deep therapy lamp. One or more blankets are arranged so that two-thirds hangs over the front of the table and one-third over the back. A coarse linen sheet is laid upon this, either wet or dry, in a similar manner. The patient is directed to hold the arms high above the head while one-third of the sheet is brought over the front and tucked in under the right side. The arms are then placed at the sides and the other two-thirds of the sheet brought over and tucked in tightly under the left arm. This done, the several layers of blankets are wrapped about the patient in a similar manner, care being taken to have them fit snugly about the neck so that no cold air is admitted during any slight movement of head or shoulders.

This wet pack is valuable in conditions of restlessness and nervous excitement, with or without insomnia. If the patient falls asleep, he may be permitted to remain until he awakens. The wet pack may be used to increase elimination in cases of autotoxemia.



BODY PACK

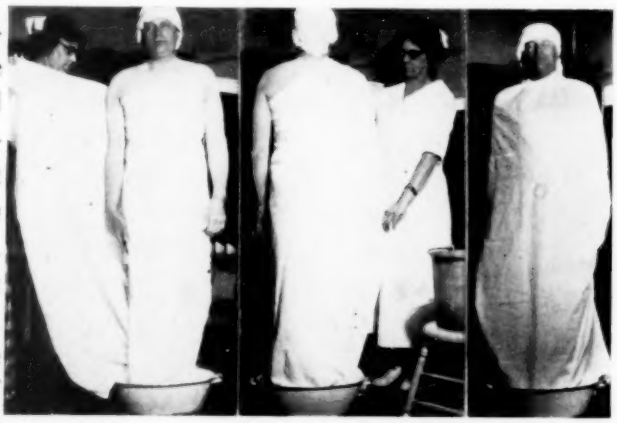
Fig. 1.—The first stage of applying body pack. Two-thirds of the linen sheet is brought over the front of the body. Arms above the head.

Fig. 2.—The second stage. The remaining one-third of the linen sheet is tucked in firmly about the neck, side and feet.

Fig. 3.—The third stage. The blanket is applied in a similar manner, so that the patient is enveloped like a mummy.

Sheet Bath. This shows the method of applying the dripping sheet bath. The patient stands in a foot tub partially filled with warm water. A linen sheet is gathered into folds at one end and grasped so that two-thirds are held in the right hand and one-third in the left. It is then dipped into the pail containing water at 70° to 80° F. until it is thoroughly soaked, then lifted out dripping and applied to the body of the patient in the following manner: The patient is asked to raise his arms high above his head. One corner of the sheet is held in the right axilla by the patient lowering his right arm. It is then carried across the front of the chest, under the left arm, over the back of the chest and the right shoulder and then over the left shoulder. In this way no two skin surfaces are in contact. During the bath an attendant applies friction by rubbing the body surfaces through the sheet with one hand and applies fresh portions of water with the other.

This is a very valuable tonic procedure and can be used in the absence of the douche room control table in treating neuroses and psychoneuroses.

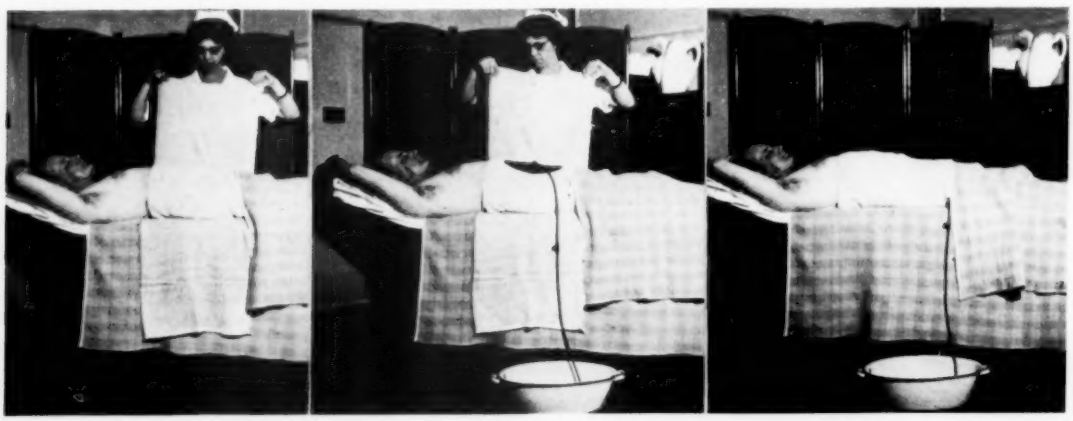


SHEET BATH

Fig. 4.—The first stage of applying the dripping sheet. The attendant begins under the left arm, passes the linen sheet across the front of the body and over the back.

Fig. 5.—The second stage. The sheet is passed over the left shoulder and arm and across the front of the body again.

Fig. 6.—The final stage with the body completely enveloped ready for application of friction.



WET GIRDLE

Fig. 7.—The linen binder is applied so that the abdomen is covered with two thicknesses. The woolen binder is brought over in a similar manner and pinned firmly in place.

COMBINATION COIL AND COMPRESS

Fig. 8.—The leiter coil is placed over the wet linen binder. This is completely covered with the woolen binder, which is pinned firmly into place.

Fig. 9.—The combination coil and compress complete with coil in place and covered with two thicknesses of woolen binder.

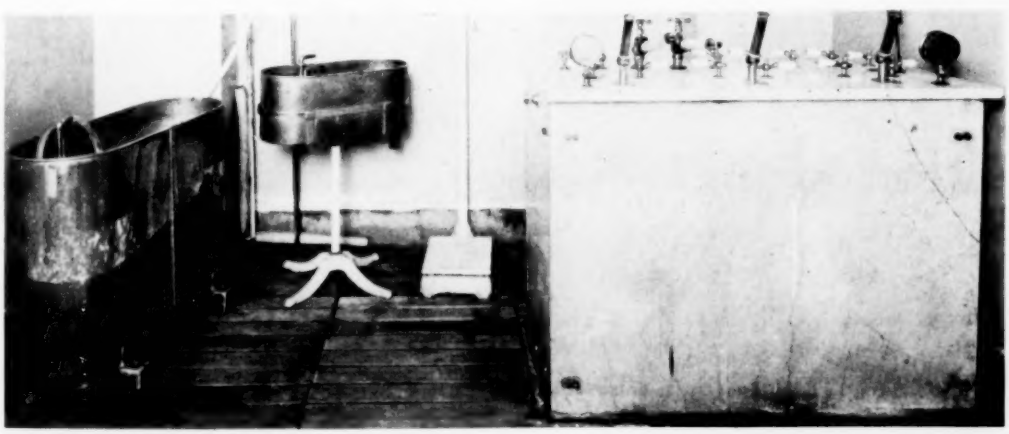
Wet Girdle. The wet girdle is sometimes called the Neptune girdle. This simple procedure is of great assistance many times in relieving obstinate insomnia, often producing sleep where the usual hypnotic remedies fail. For its application one needs a coarse linen bandage wide enough to reach from the symphysis pubis to the ensiform cartilage and long enough to extend all around the body and lap over, with a double layer in front. This is covered with one or two thicknesses of an old blanket cut an inch or two wider so that none of the wet bandage is exposed to the cold air. The various layers are applied singly and pulled up tightly and firmly pinned in place.

Combination Coil and Compress. This valuable combination was suggested by Winternitz. It differs from the wet abdominal compress by having a Lieter coil applied to the wet linen bandages before the woolen pieces are pinned into place. Water at 125° to 130° F. is allowed to run slowly through the coil for fifteen minutes, when the flow is stopped and the whole combination kept in place for the remainder of the hour.

This simple remedy has been of great help to me in relieving obstinate vomiting in functional diseases, gastric dilatation and ptosis, and anorexia.

Douche Room (P. S.). This view shows the general arrangement of the apparatus in the douche room with the control table in actual use.

Douche Room (G. H.). It has been necessary to show the douche room in two views. The first picture shows the control table. This table has been in use nearly twenty-four years, and was among the first built in this country. It is still doing good work. In the more modern type there has been no change in the general principle of control. At the left of the table are shown the whirlpool baths, one for the arm and one



THE DOUCHE ROOM

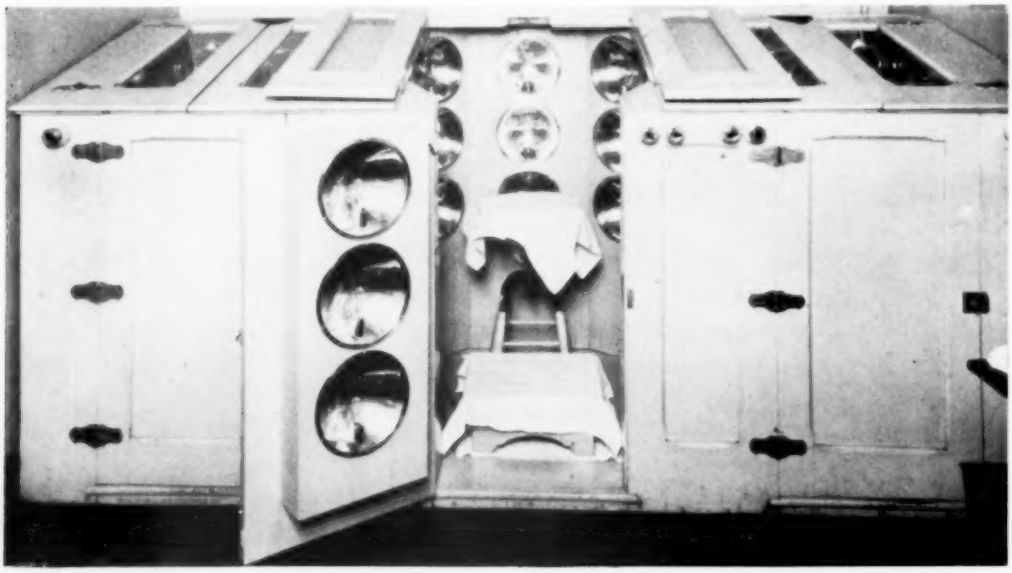
Fig 10.—The first picture shows the control table. This table has been in use nearly twenty-four years, and was among the first built in this country. It is still doing good work. In the more modern type there has been no change in the general principle of control. At the left of the table are shown the whirlpool baths, one for the arm and one for the leg. We find these very useful in the after treatment of fractures and other surgical injuries.

for the leg. We find these very useful in the after treatment of fractures and other surgical injuries. The other end of the douche room is shown in this view. Here are the circular and rain showers, the full and sitz bath tubs.

Fig. 11.—The other end of the douche room is shown in this view. Here are the circular and rain showers, the full and sitz bath tubs.

Cabinet Room. This is the cabinet room The cabinets were made after our own design. Instead of the plain mirrors we have used parabolic reflectors which focus the majority of the reflected rays directly upon the patient's body. Consequently the temperature of the box is always below the temperature of the body, even at the end of a thirty-minute seance.

Prescriptions. This is the prescription blank which we use at Grace Hospital. Every patient should be given a prescription which should be closely followed by the attendant who gives the treatment. The prescription should state the form of procedure, the duration and the part of the body to which it should be applied.



THE MEN'S CABINET ROOM

Fig. 12.—These cabinets were made after our own design. Instead of the plain mirrors we have used parabolic reflectors, which focus the majority of the reflected rays directly upon the patient's body. Consequently the temperature of the box is always below the temperature of the body, even at the end of a thirty-minute seance.

With an electric light cabinet and a modern control or douche table it is possible to accomplish results in the treatment of general debility, neurasthenia, hysteria and disturbances of metabolism, with autointoxication and its attendant symptoms, such as muscle, nerve and joint pains and arterial hypertension, where medicinal remedies fail. The massage effect of the general fan douche delivered at a pressure of forty pounds per square inch is far superior to the most skillful manual massage.

GRACE HOSPITAL

Department of Physiotherapy

Patient ..... Date .....

FORM	TEMPERATURE	PRESSURE	PART OF BODY	DURATION
Infra Red Electric Light Cabinet				
Circular Douche				
Gen. Fan Douche				
Charcot Douche				
Scotch Douche				
Gen. Fan Douche				
Whirlpool Bath				
High Frequency				
Quartz Lamp				
Deep Therapy Lamp				
Faradic Galvanic				

Fig. 13.—The prescription blank as used in the Department of Physiotherapy, Grace Hospital, New Haven, Conn.

Before undertaking the practice of hydrotherapy one needs to thoroughly master the technique, for skill in this particular is as important to the hydrotherapist as it is to the surgeon.

I would like to say a word about the treatment of arterial hypertension. For purposes of treatment these patients may be divided into two classes, namely, the nephritic and the nonnephritic. The active treatment of the two types does not differ essentially, but the results are different, and the nephritic patient requires somewhat different after-care.

A great majority of the patients complain only of toxic symptoms, such as neuritis, myostitis or arthritis. In a recent analysis of our case record of 473 patients with vascular hypertension, 308, or 65 per cent, complained of one or more of these symptoms. Many times the toxemia was caused by focal infection, but in the majority of instances no such focus was found and we were forced to conclude that the function of metabolism and elimination were at fault.

What most of these patients require, therefore, is some form of treatment that will relieve the toxemia, and we have found that these results are best accomplished by treatment with the electric light cabinet and some form of hydrotherapeutic procedure. As I said a few moments ago, the results of treatment in these two types are different. With a nephritic case it is impossible to reduce the systolic pressure below 160 mm., but with the essential or nonnephritic case it is quite possible to reduce it to within normal limits, that is, between 140 and 115 mm.

That the element of over-fatigue is a prominent factor I think we must all admit,

because rest alone will many times bring about a marked reduction in blood pressure, as well as an improvement in the symptoms in general. In our series 265, or 56 per cent, of the patients complained of symptoms of over-fatigue, such as general weakness, exhaustion after slight effort, either physical or mental, and lack of endurance. These are the symptoms that hydrotherapy is best fitted to relieve.

We see a great deal in the literature about the use of the hypotential electric current in the form of autocondensation for the reduction of vascular hypertension. Several years ago we undertook the treatment of a series of cases with this modality. We obtained a reduction of the blood pressure in many cases, but the patients did not show as uniformly good results as when treated by the electric light cabinet and some form of hydrotherapy. With the use of autocondensation there is always the element of danger from lowering the pressure below the limit of safety, which must be carefully avoided in all cases of high arterial tension where there is vascular and renal degeneration. This danger never exists with the use of the electric light cabinet, because it is impossible to reduce it below the limit which is set by nature as a compensatory expedient.

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MYOSITIS OSSIFICANS TRAUMATICA*

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I trust that I may be pardoned in presenting a discussion of a disease which is somewhat rarely encountered even by men seeing a fairly large number of cases referred for diagnostic and surgical procedure.

But as the condition we wish to present may occur in the practice of any physician and as it is one in which a mistaken diagnosis may readily occur, unless checked up by a competent radiologist, we feel justified in attempting to clarify the point of diagnosis, together with a brief discussion of the prognosis and the treatment and the presentation of a case.

*Read at annual meeting Western Physiotherapy Association, Kansas City, September, 1925.

HISTORY

While the real nature of myositis ossificans as understood at the present day is an accomplishment of pathologists and anatomists of the nineteenth century and since that time, yet in a perusal of medical history one find references in ancient literature of peculiar growths, which in their description resemble this condition.

In China during the Chow Dynasty[1] Chin Yueh Jen wrote a treatise on Osteology and described abnormal bony growths in abnormal locations. [2]Galen 131-201 A. D. wrote voluminously, but usually inaccurately, of practically every system of the body, and scattered throughout his writings are mentioned instances of abnormal bony growths, which from the description one could very readily include in this group.

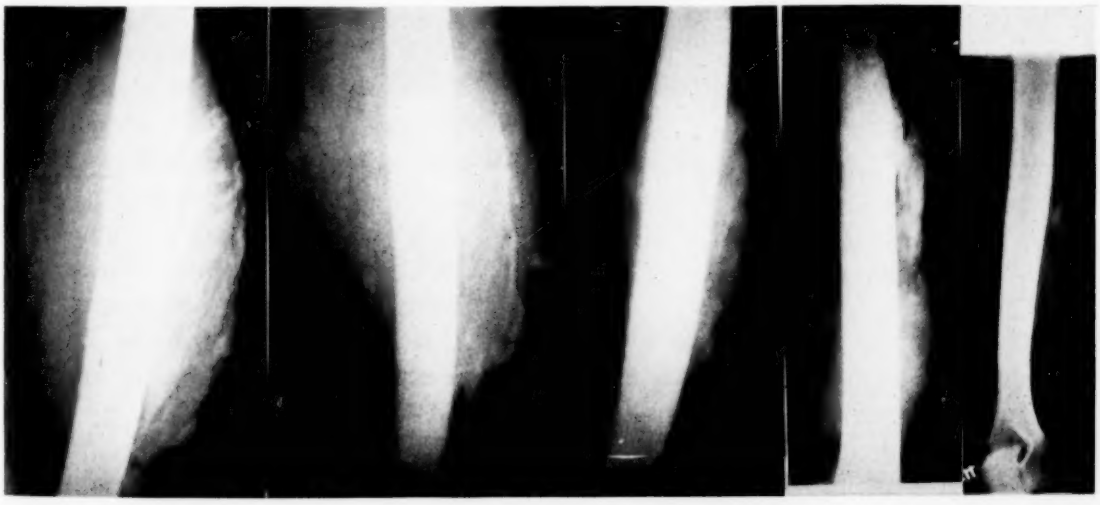
However, no accurate work of differentiation of this kind of bone tumor from the malgnant sarcoma was made till the latter part of the nineteenth century.

With the twentieth century came the x ray, and now with its more refined technic, differential diagnosis, becames a less difficult problem.

ETIOLOGY

The cause of bony formations in muscles is a matter largely debated and poorly answered. The condition is most frequently met with in the second and the third decades of life, and the quadriceps femoris, biceps humerus, and the brachialis anticus are the most frequently affected. Cases are on record where the pectoralis, latissimus dorsi, and intercostal muscles have been involved to the extent that an additional bony cage for the thorax was thus formed, as in myositis ossificans progressiva.

Several theories are advanced as to the etiology of the traumatic type. [3]It may be due to the tearing loose of periosteal cells, caused by violent contractions of the muscles, or external trauma. These



Figs. 1, 2 and 3. Roentgenograms of case reported showing ossification in the muscles of the thigh at various stages. The last one shows the end result.

Fig. 4. Roentgenogram of another patient showing ossification in the muscles of the thigh following trauma.

Fig. 5. Roentgenogram of a third patient showing ossification in the biceps following trauma received while playing basket ball.

periosteal cells with the osteclasts begin to grow intramusclarly and thus set down first cartilaginous tissue which later ossify. [4]It has also been stated that at many points throughout the body, ossification of tissue may take place if degenerative changes and deposition of calcium salts have occurred. At points in relation with cartilage and bone, instances have been met with where rather extensive new bone formation has occurred, as arthritis deformans. Injuries to muscles and fascia and inflammations of various sorts seem capable of giving rise to some changes that finally lead to bone proliferation. [5]Thus it is said that cavalrymen acquire bony plates in the muscles on the inside of the thighs, and soldiers and others, similar plates in the deltoid muscles where the gun or heavy burden rests.

It is difficult to regard such occurrences as tumors, since they seem to be merely an osteoplastic healing process which follows injury to the tissues. The progressive myostis which develops into extensive bony shells in the muscles after the inflammatory stage has subsided, may be similar in character.

The theory of connective tissue metaplasia in which the connective tissue cells undergo osseous change, sounds most plausible. In mesoblastic tissues there are many examples of the persistence of groups of cells undergoing continuous differentiation in unusual places. If we ligate the arteries of the kidney of a rabbit, the organ becomes necrotic, and quickly calcifies, after which true bone may develop about the edges of the mass.[6]

In precisely the same way the presence of necrotic material which becomes calcified may be observed in the sclerotic wall of blood vessels, in degenerated tumors, especially those occurring in the thyroid and the uterus.

Apparently we must assume that undifferentiated connective tissue cells exist nearby which become specialized in their differentiation as osteoblasts, for these calcified necrotic areas become the basis upon which true bone is formed. In the same way new sites of progressive differentiation are established in cavities left in such bone formation in the form of a definite bone marrow, producing myelocytes, erythroblasts, and all the other characteristic cells.

This can hardly be called metaplasia[3] —certainly one tissue has been replaced by another, but hardly by a direct transformation. It would seem that we have connective tissue cells serving some function unknown, that are transformed into osteoblasts. Doubtless the same thing occurs in the larynx, bronchi, or the costal cartilages, when in time they become ossified. Whether the bony metaplasia is of this sort in the case of tendons and muscles in myositis ossificans is uncertain, but it seems most plausible. At any rate the assumption of the osteoblastic function by connective tissue cells quite away from the original osteoblasts

is sometimes seen and certain lapsis from strict specificity may be observed.

PATHOLOGY

Under conditions as yet imperfectly understood, but most frequently in young persons, the bony tumor-like formation in muscles, called myositis ossificans traumatica occurs. The process begins in the fascia, aponeurosis, or periosteum and involves the muscles, secondarily. Three stages can usually be made out:

(1) A connective tissue hyperplasia.

(2) A sclerosis of this connective tissue.

(3) A formation of cartilage and bone in this sclerosed area. The bone seems to be practically normal in structure.

The muscle fibers undergo some atrophy and degeneration. There may be a fatty infiltration of the muscle and various deformities may result from shortening or progressive immobility of the part.

While inflammatory processes including syphilis, may be ruled out, trauma is certainly an important causative factor. However, masses of bone may form spontaneously with no history of injury.

Occasionally this condition is mistaken for osteo-sarcoma and several cases of amputation have been reported which later were found to be benign myositis ossificans.

A few cases of malignant degeneration, with wide spread metastasis and fatal termination have been reported.

CASE REPORT

The diagnosis will be discussed in the presentation of the following case history:

Patient: Robert D., age 16½ years, High School student, six feet, two inches tall, weight 190 pounds. Presented self for examination on December 5, 1925.

Chief Complaint: Swelling on anterior surface of left thigh, soreness, pain on motion, and inability to flex the knee. He was unable to walk upstairs in the usual manner.

Onset and Development: Early in October, soon after the beginning of foot ball practice, he developed a "Charlie Horse." He was given the usual heat baking and massage as administered by the coach and the assistants. He did not seem to improve. On the other hand he gradually grew worse, but despite this he continued to practice and played his position on the line during every game of the season.

There was no history of any definite injury until the Thanksgiving game. At this time the thigh was quite swollen and painful and he suffered a great deal during the entire game until the latter part he was taken out on account of injury to the leg.

Physical Examination: Found a well developed, almost a young giant, well

muscled and in the pink of physical condition. All systems proved negative. The only thing found in the examination was a large swelling on the anterior surface of the left thigh. It extended from about four and one-half inches above the patella upward for a distance of about nine inches.

It was markedly indurated, tender to deep palpation and quite painful on slight flexion of the knee. A hard mass deep in the quadriceps extensor muscle could be felt.

Laboratory Examination: Blood count and urinalysis were negative.

X Ray Report of December 5, as follows: "There is extensive calcareous or bony deposit in the belly of the left quadriceps extensor femoris muscle. This deposit is laid down parallel to the bone and is free from any attachment to the periosteum. About the middle of the muscle is an area one-half to one cm. wide, and about 13 cm. long, and adjacent to this other smaller area that appear more dense. They are about half the density of the femur. This has somewhat the appearance of cartilage, and has definite outline.

The deeper part of the muscle is similarly infiltrated throughout its greater portion, but is more diffuse and not quite so dense. It has a wavy ribbon-like appearance and in places seems to have formed between the muscle sheaths.

The outline of the femur is clean cut and regular with no change in cortical density. There is no evidence of pathology in the substance of the femur itself. The periosteum seems intact, and there is no connection with the mass in the muscle."

X Ray Conclusions: Myositis ossificans.

Diagnosis: Based upon the history of trauma, the sudden onset, the age of the patient, and the x ray findings, a diagnosis of myositis ossificans of traumatic origin was made.

Differential Diagnosis: This condition is differentiated from

1. Osteomyelitis.
   (1) Noninflammatory.
   (2) No leucocytosis.
   (3) No temperature.
   (4) History not typical.
   (5) X ray findings not typical.
2. Osteoma.
   (1) Not attached to the femur.
   (2) Sudden onset not typical.
   (3) X ray findings not typical.
3. Ossifying Hematoma:

(1) The prmary pain and the swelling was not severe enough and no history of definite trauma in the beginning to warrant a diagnosis of this sort.

(2) X ray findings showed no definite outlined mass as one would expect to find with a hematoma. On the other hand the shadow had an infiltrating ribbon-like appearance.

4. Carcinoma could be ruled out by the history and the x ray findings.

5. Osteo Sarcoma: This condition could not be so easily ruled out. In fact a tentative diagnosis of osteosarcoma had previously been made in this case, and as a number of cases have been reported where limbs have been amputated for osteosarcoma and later found to be a benign myositis ossificans, I have felt justified to dwell at some length on the etiology, pathology and diagnosis, even though the original title of my paper called only for treatment.

Clinically this case might have been an osteosarcoma. The age incident applies to both diseases. History of trauma likewise applies. The appearance of the leg on first examination which was quite indurated and slightly edematous, and having the feel of this type of tumor.

The x ray picture was the deciding factor. The mass was not attached to the femur, nor did it have the appearance of either an osteo or a periosteal sarcoma.

Then too, the quadriceps femoris is a favorite site for the formation of ossifying muscle tissue following trauma, especially in one of his age.

Progress and Treatment: He was treated with diathermy, the electrodes being applied laterally to the anterior part of the thigh so as to apply the current more particularly to the quadriceps extensor muscle and the tumor mass. The size of the electrodes were three and one-half inches by nine inches. A current of 1900 milliamperes was given for thirty minutes. This was followed by massage for ten to twelve minutes. Treatments were daily, except Sunday, for six weeks, then three times a week, about 40 treatments in all.

He was permitted to be about and attend school, but restrained from dancing or participating in similar activities incident to the holidays. When he first came for examination and treatment he could hardly walk. On account of pain he was compelled to swing the leg out in propelling the foot forward. He could scarcely bend the knee, and what little flexion he had was accomplished with a great deal of pain.

However, dating from the first treatment, the patient's condition began to improve. Each treatment gave a grateful sense of relief and comfort to the leg. The induration and the swelling gradually subsided and the locomotion gradually became easier. After the fourth treatment he remarked that it no longer pained him at night, and he had dispensed with an electric pad which had been his bed fellow for some weeks.

After the first week he was able to go up and down stairs and could walk with but little inconvenience. After three weeks the swelling and the induration had practically all disappeared, and the bony mass could be definitely outlined on palpation. The smaller mass in the more superficial part of the muscle is fairly movable, while that in the deeper portion is only slightly so.

By January 15 he was able to walk, run and dance, and experienced no pain or inconvenience. He has complete flexion of the knee. Radiograph January 16th shows little or no change in the bony deposit. There is no induration present other than the osseous deposit in the muscle.

Radiograph March 29th shows tumor mass assuming a more definite outline, of greater density and has a more bone like appearance. It seems slightly smaller and more compact, otherwise but little change since January 16th.

As to the outcome of the case nothing definite can be said. Cases have been reported where complete absorption has taken place after six to ten years. Some cases undergo degeneration and malignant changes occur. Surgery may be resorted to and the bone removed. The present condition of the case reported, it would seem that but little could be accomplished by resorting to surgery as he now has complete function and suffers no inconvenience. The resulting scarring and fibrosis incident to the operation would probably result in as much stiffening of the muscle as is now caused by the bony mass. No apparent effect upon the bone formation was noted from the diathermy treatment, but the relief from the acute condition that existed at the time treatment was instituted was quite gratifying.

SUMMARY

(1) The etiology of Myositis Ossificans Traumatica is traceable to injury.

(2) The pathological process of formations of the osseous mass is not definitely known.

(3) While diathermy and massage do not cause an absorption of the osseous mass, yet it does relieve the symptoms and checks further pathological process.

(4) X ray is necessary for a diagnosis.

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UTERINE REPLACEMENT BY GALVANISM

Selection of Cases

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This method involves the application of a definite and clear cut principle; therefore, success can be achieved only by limiting the treatment to such cases as are amenable to that principle. The operator who tries it on all cases of uterine malposition indiscriminately will be disappointed, and will become an opponent of the method. The following conditions cannot be thus treated:

First: Prolapse due to pressure from above, such as is found in cases of general visceroptosis resulting from atonic musculature;

Second: Prolapse due to a torn or weakened perineum;

Third: Cases of malposition or flexion due to cicatricial growth arising as a result of previous inflammations around the uterus and in the adnexa.

This method is successful in treating simple anteflexions and retroflexions, anteversions and retroversions. The anatomical condition can be corrected, and the symptoms, consisting of menorrhagia and uterine colic, can be relieved, permanently.

ADVANTAGES OVER SURGERY

The usual surgical procedure in such cases is curettage, reposition, and the insertion of a splint pessary for a couple of weeks. The curettage softens the uterus, and the pessary maintains its shape and position until it hardens again. The mere insertion of a vaginal pessary for versions may be palliative, but it certainly is not curative; in fact, the longer the pessary remains in place, immobilizing the supporting musculature of the region, the weaker the muscles become, and the worse the potential condition becomes.

Replacement by physiotherapy requires no loss of time; no period in the hospital. In fact, I was led to devise the method at the urging of women who wanted relief, but could not spare time from duties at home or at employment, for the surgical method. The relief was given at the expenditure of only a few hours of their time, an hour at a time at intervals of a week or ten days.

This method also avoids an anesthetic, which always carries a definite, even though small danger with it.

It also caters to that dread of surgery which is prevalent quite generally; which may seem unfounded and trivial to the surgeon, but which is nevertheless a real obstacle for him to deal with in treating his patient.

PRINCIPLES INVOLVED

In this method of treatment, advantage is taken of the specific actions of the galvanic current at the respective poles at the sites of application. The positive pole produces an acid reaction, and therefore shrinking and hardening of the tissue, and germicidal action. When the galvanic current is allowed to run through the body of the uterus with the positive pole in the canal, the uterus hardens and shrinks. The negative pole produces an alkaline reaction, and therefore softening and swelling. With a negative electrode in the uterine canal, the uterus becomes soft, flabby and flexible.

The procedure is to soften the uterus first, straighten it, and then harden it again in the correct shape and position. This procedure may have to be repeated one or more times before the effect is permanent.

TECHNIC OF THE METHOD

The electrode to be used in the uterus is of the shape of an ordinary uterine sound, and is made of copper unplated. I made my own electrodes out of copper wire obtained from an electrician, the smallest being No. 8 Brown & Sharpe gauge, and the largest a piece of trolley wire. One end is tapered and bent into the curve of the normal uterine canal, and a binding post soldered to the other end. All but two and one-half inches of the end is coated with sealing wax, to act as an insulator. When used, the end should be amalgamated, by first polishing smooth with steel wool, rubbing with a wad of cotton dipped in hydrochloric acid, dipping into mercury so that a drop will adhere. Then rub again with the acid saturated cotton until the entire surface is shiny and slippery with mercury. This prevents the electrode from adhering too tightly to the mucous membrane, and increases its antiseptic action.

The patient should be in the dorsal position, with the knees elevated. The field should be ordinarily clean, but no great aseptic precautions are necessary. A bivalve speculum is necessary, and should be sterilized before being used. Paint the cervix and fornices with two and one-half per cent mercurochrome or your favorite antiseptic.

In most cases it will be necessary to hold the cervix with a tenaculum forceps. Into a normal uterus, a sound is readily inserted, but one that is kinked or displaced presents difficulties; therefore the tenaculum is practically always necessary in this kind of work. It should be sterilized before using. I have found that it is possible, by being careful, to grasp the cervix with the instrument, without causing a great deal of pain. In case the patient complains too much, a little anesthetic can be injected with a tonsil syringe.

Insert an electrode of a size that enters fairly easily, in order not to cause too much pain. Occasionally I have found it impossible to insert even the smallest size; in such a case if you connect it

with the negative pole and turn on the current, it will gradually slip in quite readily and without much forcing. The electrode is amalgamated and covered with sealing wax, and therefore cannot be boiled; but boiling is not necessary, as sterilization can be taken care of by means of the electric current, as will be indicated below. It will not be possible to pass the electrode in all the way up the uterine canal in most cases; that makes no difference. Insert it as far as it will go, and turn on the current.

Before passing the current, make the patient comfortable; straighten her legs out on the table. Leave the tenaculum in place, and hold the electrode with a sandbag so that it will not slip out. The indifferent electrode should consist of two moist pads, one on the lower abdomen and the other on the sacrum, connected by a bifurcated cord to the battery.

For the first few minutes, connect the uterine electrode to the positive pole of the battery, in order to sterilize the field around it, and prevent infection. Two or three minutes will be sufficient. This is very important, for the subsequent action of the negative pole is to produce a reaction favorable to the growth of whatever organisms might be present, and to open the lymphatics to their absorption.

It is necessary to use a battery source of current. I use a 45-volt radio "B" battery. This must be furnished with an ammeter and a resistance control. A mechanical source of current cannot be used at all in this work, because the variations in the current intensity produce painful contractions of the uterine muscle so that it is impossible to give enough current volume to produce the desired effects.

Then, connect the intra-uterine electrode to the negative pole, and allow the current to run for ten minutes, at from 100 to 200 milliamperes.* This will usually suffice; if it does not, the operator can readily recognize it during the next step, and the time or current can be increased. A few minutes more time are far more effective than a few more milliamperes of current.

Next, shut off the current and put the patient back into the position for vaginal work. Hold the cervix with the tenaculum forceps, and push the electrode on up into the uterine canal, thus straightening it out on the electrode. Here is where manual skill and experience enter. The uterus is soft and flabby, and if the operator gets rough with things, he may readily perforate the uterus. However, there is a certain feel to the movements of the electrode, which can readily be acquired by a little practice, which tells the operator whether he is pushing directly against uterine wall, or against

*Some very good authorities to whom I have submitted this paper have felt that my dosage was too high. In view of their ideas, it might be well for the beginner in this technic to use a lower milliamperage until he becomes accustomed to handling it. I have used the patient's complaint of a heavy feeling in the pelvis following the treatment, as a guide to my dosage.

a kink or a stenosis. The straightening should be accomplished by manipulation and not by force.

This step involves some pain to the patient, but I have never found a case in which it was not endurable. The first treatment is the most painful; and the pain decreases with subsequent treatments to none at all. I have found no patient who was not wlling to bear this pain cheerfully if reminded at the time of the advantages of this method over a stay in the hospital and a seance in the operating room.

The tenaculum is now removed, the patient's legs put down on the table, and the electrode held in by sand bag. The electrode is now connected to the positive pole for twenty minutes, at from 100 to 200 milliamperes. At the end of this time, it will be found adherent to the endometrium, and it should not be forcibly jerked out. Reverse the polarity again, and allow the negative current to enter the uterus for two minutes; this will materially loosen the adherent electrode; finish the loosening by rotating it in place before trying to pull it out.

An occasional case may be permanently relieved by one treatment. In my work, the average case requires about six. Also, in an occasional case, I have had to put in a hard rubber or gold intra-uterine pessary for a week or two to maintain position; but this is rarely necessary.

THE APPLICATION OF PHYSICAL THERAPY TO GOITER AND ASSOCIATED DISEASES*

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ETIOLOGY

It is conceded by advanced thinkers that in the case of sporadic goiter that infections, absorption and toxemia play a major part as a causative factor. The results of these toxemias make a physiological demand for an increased secretion on the thyroid gland resulting in an increase in the cellular element with consequent hypertrophy.

The leading exponent of the gastro-intestinal absorption theory is McCarrison. According to this theory in sporadic cases the element of organisms of a certain type in the intestinal tract may determine goiter even in the presence of a sufficient quantity of iodin.

Deaver, who is a surgeon, says in the *International Journal of Medicine and Surgery*, that exophthalmos improves in well marked cases, but never entirely disappears. Late operations never produce perfect health. Young people need thyroid tissue and surgery must be under-

taken guardedly during the developmental period. The thyroid gland plays a vital part in the chain of defense against disease. Patients operated on for goiter, especially of the toxic variety, show less resistance to rheumatism, penumonia, heart diseases and tuberculosis.

Bainbridge, in the same medical journal, says the thyroid gland is subject to and exposed to attacks of toxins both from within and without. Changes in the gland caused by acute or chronic infections are illustrative of the latter condition and absorption of toxins in intestinal stasis are illustrative of cases belonging to the former group. The thyroid is susceptible to many kinds of infections, from the gums, teeth, tonsils, sinuses, lungs, and particularly from a toxic intestine. This is meant to include any undue absorption of toxic material of any character along the tract—an infected appendix, enteritis, or colitis.

Absorption of toxins from the pelvic organs, as a chronic vaginitis, endometritis, metritis, salpingitis, oophoritis, pelvic fibroid tumors, or any condition of malfunction and imbalance of the endocrine chain of glands must also be included in the list of thyroid excitants.

SYMTOMATOLOGY

Some of the very common and most noticeable symptoms of hyperthyroidism, regardless of whether or not there is enlargement, are:

(1) A rapid heart, usually with more or less dilation and weakness of the heart muscle.

(2) Muscular weakness, especially of the thighs.

(3) Nervousness and exhaustion.

(4) Disturbed metabolism and,

(5) Eye symptoms usually coming after a lapse of time in the progress of the disease.

CLASSIFICATION

There are two general classifications of goiter. First: Exopthalmic goiter, in which there is hyperplasia of the parenchyma of the thyroid gland causing overproduction of the thyrotoxin.

Second: Toxic adenoma, in which the cells of the tumor take on the function of true thyroid cells and cause hyperthyroidism.

TREATMENT

The radical methods now used in combatting this condition consist of (1) rays for removing or destroying this excess hyperfunctioning tissue, and (2) surgery.

Surgery is most in vogue, but this method is coming more and more into question as the best and safest way. The end results of surgery are very well indicated by two series of case reports emanating from the Mayo Clinic. Judd reports 100 cases of exopthalmic and 100 cases of toxic adenoma, as follows. The exopthalmic type showed 65.8 per cent cured; 13.6 per cent markedly improved; 5.6 per cent slightly improved; and 15

per cent of the patients dead from all causes. The cases of adenoma of the thyroid showed 85 per cent cured; 5 per cent markedly improved; 1 per cent slightly improved; 2 per cent not benefitted and 9 per cent dead from all causes. The report further shows a mortality from operation of a little less than 2 per cent.

The other method of destroying and indirectly removing the offending thyroid tissue is the intelligent use of x rays or radium. Inasmuch as the cells are actively dividing in the adenomatous thyroid they are somewhat embryonic in nature and as such are more subject to devitalization by the action of the rays than are the full grown resting cells in the adjacent tissues. Being thus devitalized they cease functioning and are absorbed and thrown off in a natural way. In the hyperplasia of the parenchymatous type, the inhibition is most probably through the action of the rays on the little arterioles, causing these vessels to obliterate and cease to be a blood channel. The nutrient blood supply to the gland cells lessens, causing inanition and devitalization and absorption, this whole process being somewhat analogous to the surgical ligation of part of the arterial supply, but without its manifest discomforts and disadvantages.

The thyroid gland should not be subjected to surgical procedure until radiation treatment has been thoroughly applied by an experienced radiologist who is not under obligation to anyone except the patient. Too often, perhaps, in some of our "clinics" a few "treatments" are given by a "technician" at the instance of the surgeon in charge who presumes to direct the procedure with the result that no benefit is gotten. The patient is condemned to an operation and the x ray condemned as valueless, when as a matter of truth it never had an intelligent chance. Thyroid operations would be much rarer if x rays or radium were properly applied.

A thorough physical examination should always be made of patients offering themselves for goiter treatment. If sinus disease, or tonsil infection is discovered these should be properly treated as indicated. If teeth are found to be abscessed, extraction is recommended; if gums are involved with pyorrhoea, if in the first or second stages, treatment by ultraviolet rays and mechanical methods are suggested; if there is a history of influenza or pneumonia or any other reason to do so a radiograph of the lungs is made; if pathology if the lungs or evidence of infected mediastinal glands is present, ultraviolet radiation and perhaps x rays over the glands, plus proper diet and rest is instituted; if a pathological non-surgical gall bladder or non-suppurating chronic appendix is present, suitable diathermy is vigorously used; if there is found to be a colitis or constipation or visceroptosis, ultraviolet rays are used together with a free use of the sinusoidal current to stimulate muscular activity. Diathermy is also frequently of benefit here. If there is found ovarian malfunction, a metritis, or endometritis

with menorrhagia, fibroid tumors, or if the patient is going through a troublesome menopause, x ray treatment is instituted designed to meet the existing conditions. Excepting the fibroids, it is not necessary to give enough x rays to cause devitalization of the organs of reproduction in these cases. In fibroid cases a "bloodless hysterectomy" can be done.

Then is it not pertinent to make the assertion that a patient is far more benefitted by having these causative factors treated and cured or relieved than they would be by treating the thyroid gland alone and leaving these secondary diseases unattended? Surgical removal alone leaves these conditions still existing to plague the patient and often leaves them still seeking relief.

SUMMARY

1. Physical therapy is free from danger in well trained hands.

2. No deaths occur from its use.

3. No unsightly scars mar the patient's neck.

4. There is a minimum of inconvenience to the patient and in most cases no hospitalization is necessary.

5. It is available in all classes of cases.

DEPARTMENT of TECHNIQUE

WORK ACCURACY

WM. J. MANNING, M. D.
Washington, D. C.

In attempting to apply target focus accuracy, more especially as concerns the central ray in a simple working procedure before ray exposure, the observer's attention is directed to figure one that represents or illustrates the obverse of a tube holder attached to any make of machine. The two intersecting lines spaced at right angles as shown in the photo are in reality constructed of 18-guage aluminum wire slightly tempered by passing through Bunsen flame in order to better withstand the weight of metal plumb that hangs perpendicular from the intersection. The terminals of wire lengths are secured or anchored in position by respective drops of shellac to the tube holder extension rims or rim. The wires are adjusted upon the rim in such manner as to bring the intersection exactly in the center of fine or coarse focus point on target underhang, accomplished by alter-

nate right and left lateral thrusts of tube through clamps. In other words the center of focus is brought directly in line with the crossed wires. The wire terminals are permanently anchored on tube holder rim and are never removed, the central ray passing directly through the thin aluminum wires without scatter or divergence of ray.

Figure two shows the tube holder reversed and brought into proper position with a plumb suspended from a small *swivel* hook made to lift on or off readily from the intersecting wire center. Note should be made of a carpenter's spirit level placed crosswise on tube sliding arms that further adds specifically to proper level of tube without guesswork, as the anode and cathode terminals of tube proper have been once "trued-up" or adjusted as to level by the respective tube terminal clamps. Previous to all adjustments mentioned be sure the target itself is straight and true, accomplished by slowly revolving the lamp globe. Clamp firmly and permanently the tube terminals.

No matter in which direction the tube is moved to ray the body part under examination, either lateral, horizontal, perpendicular or inclination, the plumb moves with the tube holder and can be directed exactly over the part of the body to be exposed to the central ray. When the tube is "tilted" or inclined the plumb is not utilized; instead the footrule or guiding rod is brought into action, one end being placed against the center of crossed wires and the other terminal being directed in line to the part to be exposed.

The results obtained by the method outlined and described herewith in my everyday work are made wonderfully clear as to detail when the picture is de-

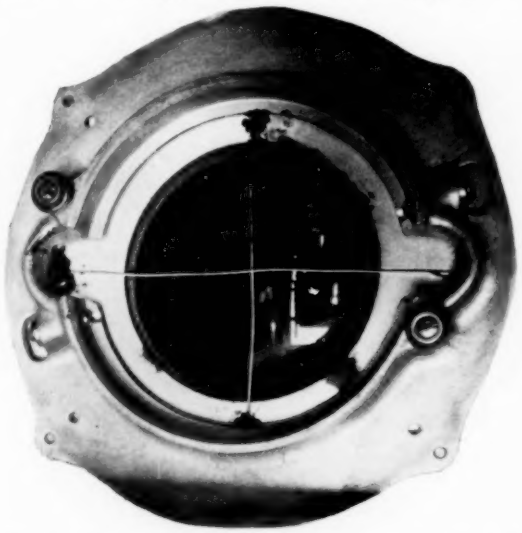

Fig. 1.—Obverse of a tube holder that may be attached to any standard outfit.

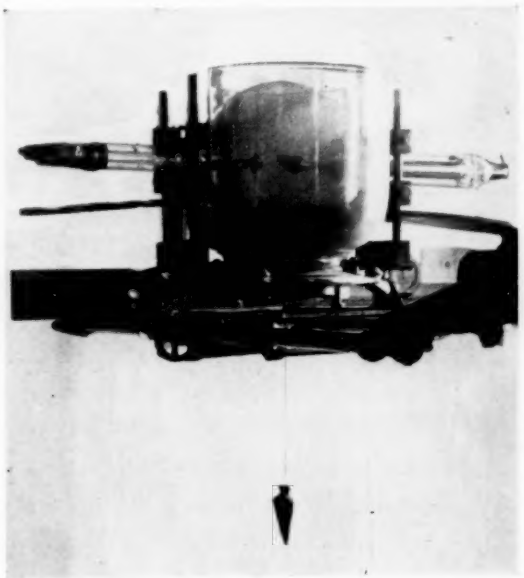

Fig. 2.—Tube holder in proper position with plumb line suspended.

veloped. Many excellent and efficient methods are in use by various roentgenologists but the lack of literature on the subject does not enable the writer to describe them.

Steps of procedure:

1. Plumb is hooked in position over wire intersection.

2. Tube is adjusted in position to cover point to be rayed, guided by plumb point.

3. Place spirit level in position on tube guiding arms and obtain level accuracy.

4. Lock tube holding mechanism firmly in position as directed by plumb point.

5. Unhook plumb and remove spirit level.

6. Expose.

Medical Science Building.

EDITORIAL

ARCHIVES OF PHYSICAL THERAPY, X-RAY, RADIUM

A Journal of Ideas and Ideals.

A. R. HOLLENDER, M. D., Editor
ALBERT F. TYLER, M. D., Managing Editor

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A. R. HOLLENDER, M. D.
Chairman Program Committee

CULTS IN MEDICINE

The American Association for Medicophysical Research was investigated by the Bureau of Investigation of the American Medical Association, and is devoted to protecting the physician and the public from all of the fly-by-night organizations and cults of various types which practice in the twilight zone of medicine —in that shady borderland where there are so many suckers to be caught.

I have been compiling recently a cultist dictionary. Practice of that kind today

is departing from the nostrum and the panacea taken internally and going into the fields of physical therapy, suggestive therapy and psychotherapy, including, of course, the laying on of hands. The financial success of chiropractic has induced a half-dozen or more cults into that field, and there are queer combinations of chiropractic, naturopathy, and similar systems. Naturopathy is headed by a man named Benedict Lust; you can imagine what he lusts for.

In every cult in medical practice, there is always an apostle, a high mogul, a potentate of some kind, or a high priest, who, with his disciples, spreads the gospel. When the high priest dies, the cult usually dies with him. The high priests have learned that one of the finest things in the world for getting a cult going and keeping it active is to form a society. The American Association for Medicophysical Research, for example, was apparently an outgrowth of an organization founded by Albert Abrams, known as the American Electronic Research Society. The word "research" is a word to conjure with, particularly for the press.

One of the dangers in the field of physical therapy is a multiplicity of organizations in the field. One wonders how many of these societies are bona fide, how many of them are devoted actually to the purposes for which they are formed, and how many of them are devoted to building up the interests of certain men or certain ideas.

While I do not care particularly to criticize the name of this organization, I am inherently suspicious of all organizations that have the word "college" in their title. The Royal College of Physicians in England and the other colleges have definite standards of entrance which represent special study and special qualifications. I do not know of any American college of physicians or surgeons which has a legal power of granting special practicing permission. When these colleges include also the assumption of titles, or alphabetic appendages, the experienced investigator grows suspicious. There is no more wonderful camouflage than half an alphabet after the name.

Aerotherapy is first in the cultist dictionary. Aerotherapy obviously means treatment by air, but in this instance hot air is particularly concerned. Aerotherapy is a method of treating disease by baking the patient in a hot oven; it ought to be called aerothermotherapy. The method has been used empirically by physicians for many centuries, for it has long been known that heat relieves pain and produces an increased flow of blood to the part treated. There is nothing essentially wrong about aerotherapy, but the claims made for it as a cure all delude many sufferers and prevent them from taking precautions in scientific treatment while they are deluded.

Here is a cult limited to hot air therapy. There is nothing more vicious in scientific medicine than the systems of therapy that adopt the all or nothing

policy. Any system founded on a single idea as to the causation of disease or a single method of treatment of all disease is bound to be fallacious.

Here is the Alereos system, a system of drugless healing which recognizes the human body as a wonderful and perfect machine which properly adjusted and taken care of will run without friction. It emanates from Brooklyn. "The Alereos system," says the folder, "in relation to the human machine, occupies the place of the skilled mechanic to the disabled engine. It searches for the causes of the trouble and seeks to remove them by its tools. These are the hands, aided by several mechanical appliances and vibration. The home office supplies heat and mechanical vibration with several specially constructed apparati."

Not content to sell its simple hot air and vibration treatments on their merits, the Alereos system plays strongly on the osteopathic and chiropractic claims of contractions and pinched nerves, and says that all drug treatment is poisoning. It is the acme of exploitation of the sweat bath and massage. One takes ten treatments for $25 in advance.

Astro healing has to do with the stars. Casanova, international lover and charlatan, tells at great lengths of his delving into magic or the drawing of horoscopes and astrology. The mystery of the stars has always had a fascination for the multitude, and it would have been strange indeed if some astute healer had failed to take advantage of this folly in the founding of a cult. Astro healers advertise principally in foreign language papers; they read the diagnosis from your horoscope, and then make an additional charge for giving the advice indicated by their readings.

You have probably heard of Dr. L. D. Rogers and autohemic therapy. Dr. L. D. Rogers is a blessing (?) conferred on Chicago by a beneficent providence. For many years he was head and chief owner of the National Medical University of Chicago, a low grade institution, virtually a diploma mill. Rogers is a promoter of medical schemes and fancies. Like many other cultist leaders, he is constantly founding societies of which he is the chief panjandrum. Once he was permanent secretary of the National Association of Panpathic Physicians, apparently an attempt to organize all the cultists into a single group. The society had only a brief existence, and the permanent secretary was temporary.

Then he began to exploit a cancer serum, and organized the American Cancer Research Society, L. D. Rogers, President. Notice the word "research" in the title. Finally he got the notion of autohemic therapy, and only he knows what that is. But it appears to have something to do with the blood, and you collect for it. His appeal is made cleverly to all anti-medical cultists. They get together with the slogan, "Without the Use of Bugs or Drugs."

Autology was founded by one E. R. Moras, who is now in the insane asylum.

Autotherapy is a pleasant idea that grew in the mind of a homeopath. Dr. Charles H. Duncan is its originator. On the theory of carrying the idea of the hair of the dog that bit you to its ultimate interpretation, he recommends the healing of boils by cooking up and swallowing the pus from the boil. For dysentery, you filter the excretions and inject the fluid that filters through. For tuberculosis, you filter the sputum and inject the filtrate.

Autothermy—Is not the same as aerotherapy. With autothermy a garment is sold for holding heat in the body, with the claim that such a method is sufficient to cure tuberculosis, asthma, and other diseases of the chest. When the law was expounded to the promoter thereof, and he was shown the error of his ways, he closed up his estab!ishment.

I will conclude with Bio-dynamo- chromatic diagnosis and therapy. That obviously is in physical therapy. Whenever the irregulars in the healing art assemble for the purpose of trading secrets and telling each other how good they are, you find among the galaxy with a lot of appellations, Dr. George Starr White, M. D., F. S. Sc. (Lond.), D. C., Ph. D., LL. D., Los Angeles. He was second vice president of the Allied Medical Association in 1918. He is also opposed to vaccines, and helps out the American Medical Liberty League. He has a fancy named system that combines a lot of hocus-pocus. To elicit the phenomenon, the patient faces east or west and his abdomen is thumped; then he faces north and south, and the process is repeated, and then colored lights are thrown on it and the thumping is continued. A ruby and blue light with associated dullness means one thing and a green light combination another. That is to say, Dr. White says so. Really, it doesn't mean anything. The F. S. Sc. (Lond.) means Fellow of the Incorporated Society of Science, Letters and Arts of London, Limited.

Lots of people who play the same game as White have the same letters. The cost of the elegant diploma is $5.00. Sometimes White also puts after his name D. C., Ph. D., LL. D. No one knows where he got those.

In 1925, White produced the last word in this fancy business, the Rithmo-Chrome and Duo-Colors. He has a lot of books to sell and a lot of apparatus. In his latest announcement, Figure 10 shows a "person sitting on a Filteray Cushion and receiving Filtered Ultrared Rays while doing Rithmo-Chrome breathing and inhaling Oxygen-Vapor or Medicated Vapor and at the same time getting the therapeutic effect that is magnetic, as he is grounded and facing exactly north and south." Dr. White says if the duo-colors are added to this, the patient is certainly getting "natural methods condenst." And if he isn't getting that, what is he getting?

MORRIS FISHBEIN, M. D.

DOSAGE AND ULTRA VIOLET RADIATION

There can be no greater contribution to artificial light therapy than some definite data on dosage of ultra violet energy. It is an accepted fact that our methods with ultra violet radiation are purely empiric, so that any information based on experimental work is not only desirable but obviously necessary for continued progress in this field.

Hill[1] states that Hausser and Vahle showed that the maximal effect, as indicated by the production of erythema, in the white skin was with wave length 2970 A. U., and that with wave length 3130 the effect was 4.5 per cent, with wave length 2890, 30 per cent, and with wave length 2530, 16 per cent of the maximal. "The main effect is produced then by wave lengths 3000-2900 which are those which come through with the high sun on clear days, when sun-burn is most intensively produced in the white skin carelessly exposed."

Colebrook, Eidenow and L. Hill (as quoted by L. Hill) showed that the haemobactericidal power of the blood is put up by a dose sufficient to provoke erythema, and that this occurred not only when erythema was produced by ultra violet radiation, but also when a lasting erythema followed the application of heat. Hill continues: "The visible rays, then, if intense enough to produce burning by heat add their effect to the ultra violet rays which can produce sun-burn in the cold. The hot mid-day sun may produce sun-burn both through the heating effect of the visible rays, and the chemical effects of the ultra violet rays. *It must be borne in mind that curative effects can be got by doses of ultra violet radiation too weak to produce erythema.*"

Bannerman[2] in his experimental work (at the Lord Mayor Treolar Cripples' Hospital, London), observed the results of rather heavy single doses of light from the mercury vapor lamp. The cases were not all tuberculous, but were varied.

"In all cases there has been noted a fall in the number of red corpuscles as a sequel to irradiations; this has been a very constant finding, so that the question of experimental error does not appear to arise. It is not known, in the absence of blood-volume determinations, whether this is a real or an apparent change. The reduction occurs immediately and persists for several days, to be succeeded in some cases by a rise above the original level."

"The total number of leucocytes may or may not be increased, but there has always occurred a rise in the number of polymorph cells, and in many cases a reduction in the number of mononuclear cells. Some monocytosis may ensue, but after the lapse of some days the normal number and disribution are reverted to."

Other blood changes are also recorded by Bannerman, especially with reference to the eosinophils, rate of corpuscular sedimentation, and haemobactericidal power.

It is probably significant, states this same writer, that these results have been obtained not in patients habituated to light treatment and pigmented, but are associated rather with the stage of erythema which is the sequel of such massive doses.

"The general deduction from these observatons is in the direction of emphasizing the view that excessive dosage is to be avoided" . . . . It would appear that a massive dose of mercury vapor lamp radiation is followed by a phase of depression of the organism, during which it is reasonable to suppose that there is some risk of the disease advancing. The danger of injudiciously great exposure to light in the case of pulmonary tuberculosis is well recognized, and may well have some basis as these observations suggest."

There is little doubt concerning the effects of prolonged ultra violet radiation as deduced by Bannerman, yet the indifferent reaction or absence of reaction after a maximum of say twenty minutes radiation has been reached, is noteworthy of our lack of accurate knowledge dosage. No striking experimental work has been performed in this country, but the writer is now engaged in a study of the effects of dosage as related to prelminary and subsequent heat radiations to the body; and also the effects of interim rest periods after the maximum radiation has been reached; and further to extend the suggestion already made that a change in the source of ultra violet radiation (carbon arc lamp, for instance) be resorted to for shorter or longer intervals in order to restore or augment the clinical effects of ultra violet radiation.

Dosage of ultra violet radiation should be definitely controlled. For this purpose a knowledge of the source of light or agent to be employed must be had. One should know roughly the blistering time of the burner and guide his maximum dosage, if such is desired, by the degree of epidermal erythema wanted. It is recognized that for practical purposes an arbitrary time unit must be resorted to, but this should be a working basis only. A patient should be closely observed at short intervals after the first treatment and erythema reactions recorded. It is simpler to gauge from a definite point than from none and the time of subsequent treatments can be fairly well estimated if a careful observation and record of the reaction of the first treatment is retained.

In conclusion, it can be said that we are somewhere in approach of the solution of the problem, but we must as yet depend on the vague assertion that empiricism and individualism predominate, "that the more remote effects of light treatment from various sources,, remain to be studied." A. R. H.

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1. Hill, Leonard, Sun and Artificial Light Treatment, Brit. Jour. Radiol. 31:25, Jan., 1926.
2. Bannerman, R. G. Some Effects of Mercury Vapor Arc Baths Upon the Blood. Brit. Jour. Radiol. 31:71 Feb., 1926.

COMMERCIALIZED ROENTGENOLOGY

We have nothing but the highest praise and regard for those who are engaged in radiographic work and x ray diagnosis. This specialty has contributed much to the advancement of our diagnostic acumen and has enhanced our therapy. The workers and students in our x ray laboratories are outstanding leaders in modern medicine.

Unfortunately, however, there has crept in on the side lines a coterie of so-called roentgenologists who are stooping to commercialized activities and who are endeavoring to do so-called x ray work for fees only. Any one can come in and have a radiographic film made, and receive a written report or opinion, provided he can pay the fee. The individual receives a report, which in many instances says nothing and is merely a grouping of words and phrases. The x ray man pockets the fee. It is regrettable that even some of our better men engage in such practices, which reflect simon-pure commercialism. The practice seems to be extending.

It is quite apparent that our radiological societies might well give thought and action to this type of practice. Radiological organizations must assume a definite stand and aggressively seek to terminate this class of work. There is but one way and that is to limit their radiographic work to referred cases, coming from bona fide physicians or surgeons. Secondly, to refrain from giving films or reports to patients and to send reports only to attending or designated doctors. It is urged that such become a universal procedure and that doctors cease referring work to the x ray man who will take a picture for every Tom, Dick, or Harry who may come to his x ray laboratory. Commercialization of roentgenology must be stopped.—*The Jour. Mich. State Med. Soc., July, 1925.*

WALKER OVEREND, M. A., M. D., B. Ch. (Oxon.), B. Sc. (Lond.), L. S. A.

The death of Dr. Walker Overend has deprived the world of radiology of a learned scholar and one of the early users of the x rays for elucidating the diagnosis of the disease of the chest. After a distinguished academic career—first at the University of London, where he obtained the degree of B. Sc. with honors in zoology, and afterwards at the University of Oxford, where he obtained the Brackenbury Scholarship at Balliol College, first class honors in the Final School of Natural Science, and the Radcliffe Travelling Fellowship, he proceded to St. Bartholomew's Hospital and qualified in 1892, and obtained the degree of M. D. in 1895. The same year he was appointed Physician to the Prince of Wales' Hospital, Tottenham. He practiced at Edmonton, until 1899, and afterwards at Clacton-on-Sea, till 1912.

He then retired from general practice and devoted his attention to radiology and became chief assistant in the elec-

trical department of St. Bartholomew's Hospital and worked with the late Dr. Hugh Walsham. He conducted private practice, not in London, but at St. Leonard's-on-Sea and obtained the position of radiologist to the Royal East Sussex and Buchanan Hosptals, Hastings. During the late war he served as radiologist to the Victoria Hospital for Diseases of the Chest, and worked in the electrical department of St. Bartholomew's Hospital.

Failing health compelled him to relinquish practice in August, 1925, and he died on February 10th, 1926, at the age of 68.

Dr. Overend was one of the first to foresee the important part which the x rays would play in the diagnosis of diseases of the chest. His wide experience as a clinician admirably fitted him for the radiological study of the region to which he devoted many years of his life. In 1920 he published the first volume of his work, *Radiography in the Chest*. The second volume is now in the press. He contributed many papers on medical and radiological subjcts. During his tenure of the Radcliffe Traveling Fellowship he conducted research at Strasbourg on the action of curare and veratrin on striated muscle.

Dr. Overend was a quiet and reserved man. Outwardly he sometimes appeared stern, but his disposition was kindly in the extreme, and he would always help those who asked his advice. His indifferent health and the fact that he resided a considerable distance from London prevented his attendance at the meetings of of the Section of Electrotherapeutics of the Royal Society of Medicine, and few of the members of this section knew him intimately. The extent of his scholastic knowledge, his wide clinical experience and his general erudition soon became apparent to those who worked with him. His death is a loss to radiology, and will be mourned by all those who knew him or were acquainted with his work.—*British Institute of Radiology.*

THE ANNUAL BEAUMONT MEMORIAL AWARD

To encourage investigations of alimentary tract function, Dr. Frank Smithies, Chicago, has presented to the School of Medicine of the University of Illinois, bonds in amount sufficient to yield annually, in perpetuity, not less than $100.00. This fund is known as "The William Beaumont Memorial Fund" and the income therefrom, as "The Annual Beaumont Memorial Award."

The award is to be made each year to the research or clinical investigator, who, in the judgment of a Faculty Committee, has contributed the most important work during the year, in the field designated.

The first award will be made in 1927. Manuscripts covering investigations do not have to be entered specifically for the award nor is it required that they be sub-

mitted to the Faculty Committee. The award is to be granted by the Committee after it has considered carefully all investigations published during any year in periodicals throughout the United States. Thus, the award is available to workers in any institution, and is not confined to members of either faculty or student body of the University of Illinois.

MEDICAL SOCIETY OF THE MISSOURI VALLEY

THE 39th annual meeting of the society, to be held jointly in Omaha and Council Bluffs, promises to be one of the most important sessions of this time honored organization. The Missouri Valley Medical Association has been for many years an organization for the dissemination of medical knowledge and exchange of ideas among the profession of the states lying wholly or in part in the great Missouri river basin. Last year a remarkable program was given by this society in St. Joseph, Mo. For variability and value of material presented it was equal in quality to that given at the great session of the Tri-State at St. Paul a month later. The contributions to this program by the various departments of the Universities of Missouri, Kansas, Iowa and Nebraska were of a high order. This session did not receive the appreciation that was its due from the profession of the region.

The Universities of Missouri, Kansas, Iowa, Nebraska and Creighton University have promised for this year short, snappy contributions on subjects applicable to the day's work of the practicing physician. It is imperative that the practitioner be kept acquainted with the work going on in the laboratories, and there is no better way of maintaining this contact than by having the laboratory teachers in our medical schools appear and present "their stuff" at frequent intervals before associations composed of practitioners.

The program planned for the Omaha-Council Bluffs meeting will consist of papers and lectures on various scientific and clinical subjects and clinics. Fully half of the time will be devoted to clinics given by men of national reputation. Among those who have already consented to appear on the program and hold clinics are: Dr. Hilding Berglund, Professor of Internal Medicine at the University of Minnesota, Minneapolis; Dr. Elliott C. Cutler, Professor of Surgery of Western Reserve University, Cleveland; Dr. Irving S. Cutter, Dean of Northwestern University College of Medicine, Chicago; Dr. McKim Marriott, Professor of Pediatrics of Washington University, St. Louis; Dr. E. C. Rosenow of the University of Minnesota, Mayo Foundation, Rochester, and Dr. Gabriel Tucker of the Bronchoscopic Clinic of the University Hospital, Philadelphia.

Negotiations are under way with several other men of equal prominence in their respective lines.

The Program Committee will make this meeting one that no up-to-date

clinican can afford to miss. A complete program will be published in ample time. Reserve the dates now—September 15-16-17. Headquarters—Hotel Fontenelle, Omaha, Dr. A. D. Dunn of Omaha is president. The program committee is composed of:

John E. Summers, Omaha, Chairman.

Donald Macrea, Council Bluffs, Vice-Chairman.

William Wherry, Omaha, Nebr.
P. T. Bohan, Kansas City, Mo.
E. H. Skinner, Kansas City, Mo.
T. G. Orr, Kansas City, Mo.
J. M. Mayhew, Lincoln, Nebr.
Granville N. Ryan, Des Moines, Iowa.
Guy L. Noyes, Columbia, Mo.
Fred Smith, Iowa City.
John M. Bell, St. Joseph, Mo.

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Earl Sage, Omaha, Nebr.
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CHAS. WOOD FASSETT, M. D.
Secretary.
115 East 31st St., Kansas City, Mo.

PHYSIOTHERAPEUTIC LECTURE CLINIC

The monthly physiotherapeutic lecture clinic held under the auspices of H. G. Fischer & Co. will take place Monday, September 13th, 1926, at their home office, 2333-2343 Wabansia Ave., Chicago. The following material has been arranged:

General Practitioners' Physiotherapy Problems, 10 to 11 a. m., H. M. HALL, M. D., New Carlisle, Ind.

Diathermy in Treatment of Gynecological and Genitourinary Conditions, 11 to 12 a. m., LLOYD M. OTIS, M. D., Celina, Ohio.

Practical Applications of Physiotherapy, 1:30 to 2:30 p. m., H. M. HALL, M .D.

Low Wave Generator in the Treatment of Disease—Demonstration of Technic, 2:30 to 3:30 p. m., LLOYD M. OTIS, M. D.

AMERICAN BOARD OF OTOLARYNGOLOGY

The next examination given by the American Board of Otolaryngology will be held in Denver, Colo., at the University Hospital on Monday, September 13, 1926. Application should be made to the Secretary, Dr. H. W. Loeb, 1402 South Grand Boulevard, St. Louis, Mo.

NEW EQUIPMENT

STABILIZED X RAY TIMER

VICTOR X RAY CORPORATION, CHICAGO, ILL.

Whenever a new Victor development is announced, it is simply the response of our research and engineering departments to the needs of the profession. A new or improved design of apparatus is therefore Victor's tribute to the profession, by way of keeping pace with the ever increasing requirements due to these advances. Such is progress.

For many years the Victor Universal X Ray Timer has proved adequate for every phase of x ray work, and it was hardly conceivable that still greater refinement in an x ray timer would be looked for. But close observation of what has been transpiring in the radiographic laboratories the past two years is very convincing that the roentgenologist is ready and waiting for a new type of x ray timer with which he might more efficiently and conveniently do this work according to some of the newer techniques that have been developed in this period.

These newer techniques involve what is frequently termed "flash" radiography, which means exceedingly short exposure periods (as short as one-twentieth second), using high milliamperages and long distances (from three to six feet) between tube target and film. Many skilled technicians have been doing splendid work of this nature, using the Victor Universal X Ray Timer. Not, however, without close attention to certain details and preliminary tests, to make sure that the timer was set especially to compensate for abnormal "line" conditions existing at the moment. In laboratories where this class of work is of considerable amount it, of course, consumes much valuable time.

The use of "flash" radiography of the heart, chest, gastro-intestinal and gall-bladder is increasing to such an extent that the roentgenologist is now in need of a timer which will not only measure with absolute accuracy these short exposure periods, but which will also permit of the necessary settings quickly, thus conserving the time and patience which he has been devoting to working out the technique with timers not primarily designed for this purpose.

When it is said that the Victor Stabilized X Ray Timer will measure exposures from one-twentieth second up with a precision that is hardly believable regardless of whether the "line" voltage fluctuates 20 volts either way from a

normal 110 volt line, and requiring no more of the operator's time for setting than is used for the average radiograph, then technicians will appreciate just what has been achieved by Victor engineers.

This instrument has many advantages. First of all, it has a dial face that is so generous in size that it may be read distinctly from a distance. This face measure nine and a half inches in diameter. A small pilot light at the top illuminates the entire face. To move the pointer over the entire scale of twenty seconds represents a total travel of 30 inches which means one and a half inches for each second—ample for accurate setting under every condiion. In the space between zero and one-half second is a special ratchet mechanism which divides the scale into one-twentieth seconds —at each division a definite click which is both hard and felt when the operator makes his setting, thus eliminating guesswork. From one-half second up each second on the scale is divided into one-fourth second spaces. No imagination is required to realize the advantages here provided.

Three elements comprise the timer, as follows:

1. Timing element.
2. Magnetic Circuit Breaker.
3. Foot Switch.

THE TIMING ELEMENT

This, of course, is the vital element of the instrument and it has necessarily required considerable departure from the older principles of design in x ray timers. The constant speed motor, with which the time interval is measured, has an auxiliary speed control device of such ingenious design as to make possible the precision sought. The object here is to keep the speed of the motor constant under all conditions. To this end a small centrifugal governor is introduced, mounted on the motor shaft, which actuates extremely light vibrating contacts momentarily as the speed of the motor tends to change. These contacts, vibrating many times per second, cut in and out a small resistance between the line and the

motor, thus stabilizing the speed of the latter. Fluctuations in line voltage or frequency are therefore instantly compensated for. These sensitive vibrating contacts have much the same function as those so effectively used in the Victor-Kearsley Stabilizer, the efficiency of which is universally recognized. This is but a broad description of the element and does not offer a true picture of the many fine details of electrical and mechanical skill involved, but suffice it to say that timing error due to voltage fluctuations normally met with has been reduced to practically zero, and on fluctuations corresponding to 90 volts minimum and 130 volts maximum on a nominal 110 volt line, this error is but from 1 to 2 per cent.

It is a fact of no little significance that we were obliged to develop a special electrical device for testing the accuracy of this new timer, as a routine procedure in production, every instrument being subjected to this critical test.

It is indeed an instrument of reliability which will be welcomed by the technician who is constantly confronted with the problem of unknown quantities due to fluctuations in the "line" supply. While the Victor-Kearsley Stabilizer relieved him of some of these difficulties by insuring a constant current through the Coolidge tube, in spite of a fluctuating "line," now comes further relief in the new Victor Stabilized Timer, which insures the accurate time measurement of that current. These two instruments therefore offer an ideal combination never before available, and with which standardized technic means perfect duplication of results.

THE CIRCUIT BREAKER

This element is the lower unit shown in the illustration and is the same type as used in Victor x ray timers for years. The switch is immersed in oil, in accordance with approved engineering practice. Oil immersion is proof against arcing, regardless of how heavy the current at the break. Positive in action, this circuit breaker has proved itself efficient under all conditions.

THE FOOT SWITCH

This element, too, is retained without any change, for the self same reason that it has proved itself as being of correct design for all operating conditions. It is of the two-circuit type, making it possible to turn the high tension current on or off during the fluoroscopic examination, while simultaneously cutting in or out of the circuit the blue lamp in the fluoroscopic room. With this switch it is impossible to leave the x ray current on unknowingly, as the circuit is completed only through pressure of the button. This applies whether the timing element is in or out of the circuit.

QUICK CHANGE FROM RADIOGRAPHIC TO FLUOROSCOPIC SETTING

In fluoroscopy the timer simply acts as a control medium whereby the tube can be energized at will. The small motor switch situated on the face of the dial is turned to "Fluoroscopic," which

cuts both the motor and pilot light out of the circuit, so that no attention need be paid to the position of the pointer.

FLEXIBILITY OF INSTALLATION

While the usual procedure is to mount the timer element and circuit breaker on the wall in the same relative positions as shown in the illustration, the installation may vary from this to suit the convenience of the operator and to conform with the arrangement of th elaboratory.

UNIVERSAL ADAPTATION

It follows that with this high degree of accuracy reached in measuring extremely short exposures with heavy currents, this instrument leaves nothing to be desired for the balance of the radiographic work in the busy laboratory. Regardless of the make of x ray apparatus you are now using, the Victor Stabilized X Ray Timer may be installed in connection therewith.

From every standpoint—design, operating efficiency, mechanical and electrical workmanship, finish and appearance, this instrument measures up to the long established Victor standard of quality. As with everything else bearing the Victor trade mark, it is offered to the roentgenologist in the full belief that it is the best possible to be had through present day engineering knowledge and manufacturing skill.

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THE STUDENT'S LIBRARY

BOOKS RECEIVED

This column is devoted to acknowledgment of the books received. Such acknowledgment must be regarded by the sender as sufficient recognition of the courtesy until time and space permit selections to be made for review.

PRACTICAL INDEX TO ELECTROTHERAPY. With index of diseases and descriptive techniques. Second edition. *Joseph E. G. Waddington,* M. D., C. M (Bennett). Cloth. Pp. 374 with 170 illustrations. Published by the author, 110 Atkinson Ave., Detroit, Mich., 1926.

ROENTGEN INTERPRETATION. A manual for students and practitioners. Third edition, revised. By *George W. Holmes,* M. D., Roentgenologist to the Massachusetts General Hospital and Assistant Professor of Roentgenology, Harvard Medical School, and *Howard E. Ruggles,* M. D., Roentgenologist to the University of California Hospital and Clinical Professor of Roentgenology,, University of California Medical School. Price $5.00. Cloth. Pp. 326 with 226 illustrations. Philadelphia: Lea & Febiger, 1926.

MODERN METHODS OF AMPUTATION. By *Thomas G. Orr,* A. B., M. D., F. A. C. S., Professor of Surgery, University of Kansas. Cloth. Pp. 117 with 125 illustrations. St. Louis: C. V. Mosby, 1926.

EMERGENCY SURGERY. The military surgery of the world war adapted to civil life. By *George de Tarnowsky,* M. D., F. A. C. S., D. S. M., Colonel M. C., O. R. C. (378th Medical Regt.), Professor of Clinical Surgery, Loyal University Medical School; Attending Surgeon, Ravenswood Hospitol, Chicago; Attending Surgeon, Cook County Hospital 1913-1919; Author of Medical War Manual No. 7, Military Surgeon of the Zone of Advance. Price $7.50. Cloth. Pp. 718 with 324 engravings. Philadelphia: Lea & Febiger, 1926.

INTERNATIONAL ABSTRACTS

CUTANEOUS SYSTEM

Treatment of Acne Vulgaris. E. K. Straton, M. D., Calif. & West Med., 23:1301-1303, October, 1925.

X ray is the best present therapeutic measure in the treatment of acne vulgaris. After correcting any constitutional disturbance, the pustules and subcutaneous abscesses should be cleared up by surgery followed by a wash of 8 per cent magnesium sulfate or sodium chloride, 8 per cent sodium bicarbonate and 4 per cent boric acid solution. The best results the author attributes to the use of stock mixed staphylococcus vaccines. The thickener skin and comedones must next be removed. Using a keratolytic paste ointment or lotion, such as 2 grains bichloride of mercury, 2½ drams each salicylic acid and camphor in 3 ounces alcahol, applied twice daily will remove the hyperkeratotic condition in from four to seven days. The skin is now ready for x ray therapy.

Begin with a 10 per cent of an erythema-producing dose and give five weekly treatments, increasing the dosage 5 per cent each week. In the aggregate, such intermittent dosage does not exceed a single skin erythema-producing dose. In order to avoid the serious sequelae the author advises never to allow the combined fractional dosage to exceed a skin erythema dose without giving the patient at least a two-week rest period.

PRURITIS ANI

Pruritis Ani. M. A. Lyons,, M. D., Am. J. Electroth & Radiol., 43:139-143, April, 1925.

In the treatment of this condition, the author has developed what he considers successful therapy. After attempting to eliminate the causative factor and contribute to the improvement of general hygienic conditions, the first step in the therapy is roentgen rays. For this the knee-chest position is used whenever practical, centering the rays on the anal region and protecting the genitals and surrounding tissues from the rays. Preliminary cleansing of the parts is essential. The equivalent of one skin unit with a six inch back up, three milliamperes current, and two minutes exposure at an eight inch distance without filter was used. The first treatment consisted of a one minute exposure, followed the next week by one third of a unit and then by one quarter of a unit. At no time was more than one complete unit given within the first three weeks, and a similar dose within the next four weeks. This was well within the zone of safety. Where one treatment a month of x rays was given, a complete unit was employed. This plan was followed in mild cases. In the more stubborn cases the filter was used. The dose consisted of five milliamperes, eight inch spark gap, two minutes and fifty-three seconds at ten inches distance through three millimeters of aluminum. This gave one filtered unit. The time was divided in two to give one-half a filtered unit. No more than two filtered units were given in the first six weeks, followed by an interval of two weeks of rest, and then repeated. This was always in divided doses. Never was more than two filtered units given in any of the cases within a period of two months. When using both the filtered and unfiltered rays, the procedure was to give one eighth of an unfiltered unit every two weeks, together with one filtered unit each week. This should be within the erythema dose and is not to be exceeded.

The second portion of the treatment was usually the application of the galvanic current. The advantages enumerated indicating its application are: (1) the increase in the local blood supply; (2) increases nutrition; (3) helps relax the sphincter; (4) promotes cellular metabolism; (5) aids in the absorption of newly formed tissue. The dosage, when using the galvanic current, ranged from five to ten milliamperes, rarely more. The individual tolerance is the best guide always. The current is gradually increased up to tolerance. A 6 per cent silver nitrate was used from the positive pole and a 20 per cent Lugol's solution from the negative for fifteen to forty-five minutes.

RESPIRATORY SYSTEM

The Roentgen Aspect of Empyema in Children. John R. Carty, M. D., and Charles Liebman, M. D., Am. J. Roentgenol., 14:215-221, September, 1925.

This paper is based on a study of roentgenograms and clinical aspects of 225 cases of empyema and 100 cases of nonpurulent effusion covering a period of thirteen years.

In roentgenographing chest in children the first and most obvious point to observe is the size of the chest. One must realize that the size of a child's chest will permit a relatively small accumulation of pus. It is, therefore, comparatively rare to find a shadow of such density that the rib outlines are lost. For the same reason, the costophrenic angles can often be outlined even though there is a relatively large effusion present.

A child's chest is mobile. This small accumulation of pus will likewise cause an asymmetry of the chest and sciolosis of the thoracic spine. This is entirely distinct from the later permanent changes due to chronic fibrosis within the pleural cavity.

Pathology in a child's chest may rapidly change, so frequent observation is warranted.

Stereoscopic films are not as a rule attempted. An A-P view in the upright and prone position, with the spark gap and milliamperage varied according to the size of the patient, will give all the necessary information. One must be careful, however, that the child is in a symmetrical upright position or erroneous deductions may be made. In examining the films, one should look first for asymmetry of the chest and scoliosis of the thoracic spine, second for organ displacement, particularly the heart. In the adult obliteration of the costophrenic angle is an important cardinal point. Such does not hold true with children. The effect on the shadow of change in position is also important.

In establishing the diagnosis, consolidation must be considered. Occasionally consolidation and fluid are seen simultaneously. The overlying fluid may mask the pulmonary pathology. Consolidation by itself does not show asymmetry of the chest or scoliosis of the thoracic spine. The heart and mediastinal contents are not displaced away from the affected side. There is no fluid line along the lateral wall, and the shadow is somewhat denser in the middle.

At times a pericardial effusion may cast a shadow bearing a striking resemblance to empyema or vice versa.

Bronchiectasis can cause confusion only in the acute stages, when it resembles pneumonia.

In massive collapse of the lung the heart is displaced to the affected side and there is greater density of the shadow.

CHRONIC COUGH

Roentgen Ray Treatment of Chronic Cough in Children. Mulford K. Fisher, M. D., Am. J. Roentgenol., 14: 244-246, September, 1925.

Pediatricians or general practitioners who have worked with children will probably appreciate

the efforts of the author. One of the most antagonizing conditions to fight is a chronic persistent cough in children—often a symptom without any evident underlying pathology. The entire therapeutic gamut is run, the resources of the materia medica are exhausted and despite this the harassing cough persists.

Empirical medicine is always scorned in this day and age. We should always attempt to establish the condition and treatment on a scientific basis; but when such cannot be done empirical medicine must be practiced.

The condition which the author recommends the empirical application of the roentgen ray is in a group such as: The children are from 2 to 9 years of age—rarely older, and in only an occasional instance younger; they are usually healthy appearing, well nourished and without any distinctive physical signs in the chest. Occasionally a few rales may be heard, but usually auscultation and percussion yield no information of any detectible intrathoracic pathology. And yet in all these cases there is a history of long standing cough, very often harassing and persisting even during sleep. The cough is in most instances nonproductive. Occasionally some glary mucous is expelled. Some attacks are paroxysmal in character and may simulate bronchial asthma from which it can usually be differentiated by the lack of dyspnoea, the accompanying breath having in type and rapid respiration. The longer duration—some cases may be of several years' duration—will serve to distinguish it from whooping cough.

Roentgenologically there are no typical findings, and clinically there is no definite clinical entity. However, the results from roentgen therapy have proven highly gratifying to the writer. "Complete cessation of the cough is obtained in practically every instance. While I had a number of these patients in years past, it is only within the past eight months that a detailed record was kept of the cases. During this period 22 children were treated by roentgen irradiations for this idiopathic cough. Twenty were entirely relieved in from two to five exposures. In only two was no relief afforded. Treatments were given in a subintensive dose weekly at ten day intervals. In two instances the cough subsided within forty-eight hours after the first treatment, and there has bee no recurrence."

ABSCESS

Post-Tonsillectomic Pulmonary Abscess. Chevalier Jackson, M. D., Sc. D., Atlantic M. J., February, 1926.

It has been the observation of the author that pulmonary abscess is not as infrequent a complication of tonsillectomies as some would have us believe. He cites a series of 227 cases of pulmonary abscess reported by Frederick T. Lord in which he found 96 following operations, 78 of which were due to operations about the upper respiratory tract, 49 tonsillectomic complications. The route of infection may be one of three: aspiration, hematogenous or lymphogenous. It is in the diagnosis of the condition that the roentgen ray plays its part. "The roentgen ray is a most important diagnostic means, and is especially called for in every case to exclude the presence of a tooth, fragment of instrument, or other foreign body in the lung." In the treatment, antibechics and sedatives should not be used to mask one of nature's best means of defense. Drainage is necessary at the right time. This may be done externally or bronchoscopically. For one so skilled as the writer, one could do no better than to suggest the latter method.

LUNG SUPPURATION

Bronchoscopy in Lung Suppuration. Louis H. Clerf, M. D., Atlantic Med. J., 29: 45-46, October, 1925.

The author presents some case histories and remarks that it has been the experience of those at the Bronchoscopic Clinic that the best results are obtained when bronchoscopic treatment is in-

stituted early and continued in conjunction with postural drainage and the usual general measures of treatment advised by the internist and carried out under his direction.

Diagnostic bronchoscopy presents a means of obtaining objective information regarding the interior of the tracheobronchial tree. In skillful hands it can be quickly and safely done without a general anesthetic.

Not every case of lung suppuration is suitable for bronchoscopic treatment. Only by close cooperation of the internist, roentgenologist, surgeon, and the bronchoscopist can the best interests of the patient be served and scientific progress made in medicine.

MILIARY TUBERCULOSIS

Healed Miliary Tuberculosis of the Lung. William S. Middleton, M. D., Am. J. Roentgenol., 14:218-221, September, 1925.

Miliary tuberculosis has long been considered uniformly fatal by the profession at large. According to the writer, convincing proof of a previously theoretical hypothesis of arresting an apparent overwhelming tuberculization was lacking until the report of Opie and Anderson in 1920. In the present article the author wishes to present a case report in which he considers the occurrence of such a phenomenal immunization.

SURGICAL TUBERCULOSIS

Surgical Tuberculosis Treated with Carbon Arc Lamp. Paul Kurt Sauer, M. D., Am. J. Electroth & Radiol., 43:270-274, July, 1925.

The carbon arc lamp is an effective agent in curing cases of surgical tuberculosis. It is as effective as the natural light from the sun and has the advantages of convenience and independence of the weather. It is just as effective, if not more so, than the x rays without the attendant dangers. It is far more effective than the quartz mercury vapor lamp, as has been amply demonstrated by Reyn.

LOCALIZATION NON-OPAQUE BODIES

Non-Opaque Foreign Bodies in the Air Passages: X Ray Diagnosis and Localization. Willis F. Manges, M. D., Brit. J. Radiol., 31:119-149, April, 1926.

Dr. Manges is associated with the Bronchoscopic Clinic under the direction of Dr. Chevalier Jackson at the Jefferson Hospital, Philadelphia. His article was presented before the First International Congress of Radiology held in London last year.

The object of this paper is to show that the x ray diagnosis and localization of the non-opaque foreign body, when lodged in the bronchus, may be made with almost the same degree of certainty and accuracy as in the case of the opaque foreign body, and that, when lodged in the trachea, if not revealed in the first examination, repeated examinations will reveal all but a very small percentage of such bodies. This small percentage is made up of those that can be diagnosed most readily by physical signs because they are of such size and shape as to be freely movable in the trachea and are not of such size and shape as to cause expiratory obstruction.

Following the aspiration of these non-opaque foreign bodies, for the most part vegetable in nature, an inflammatory reaction results. Four distinct types of changes take place in the lungs because of the foreign bodies of this kind

1. Obstructive emphysema.
2. Atelectasis.
3. Drowned lung.
4. Lung abscess.

In obstructive emphysema the lung distal to the foreign body is overdistended with air because there is greater obstruction to the air current at expiration than at inspiration. When it is in a main bronchus, one entire lung is overdistended as shown by (1) increased transparency of the affected lung; (2) depression and

limitation of motion of the diaphragm on the affected side; (3) displacement of the heart and other mediastinal structures to the unaffected side at expiration. When the foreign body is in the trachea, there is (1) increased transparency of both lungs, (2) depression and limitation of motion of both diaphragms, (3) rotation of the heart so that its transverse diameter is less at expiration than at inspiration. "We have seen causes for obstructive emphysema other than intratracheal or intrabronchial foreign bodies. In children, there was always definite radiographic evidence of enlarged glands or of some dense pathologic process n the region of the bronchus obstructed."

Atelectasis or collapse of the lung distal to the foreign body occurs when the size and shape of the foreign body are such as to obstruct the bronchus completely to inspiration. The radiographic appearance of the lung is just the opposite of that seen in the former condition. In obstructive emphysema there was obstruction only to expiration, whereas in atelectasis there was obstruction also to inspiration. The x ray diagnosis of atelectasis depends (1) upon the density of the shadow, (2) the diminution in the size of the lung involved, and the (3) displacement of the heart and other mediastinal structurs to the affected side.

Drowned lung is a condition in which the exudate arising distal to the foreign body gradually goes by gravity into the smaller bronchi and air vesicles, filling them and driving out the air or causing it to become absorbed. It seldom occurs that drowned lung as a radiograph sign is the only diagnostic sign present in foreign body cases, but it has occurred in a few instances. The shadow of the involved area is more dense and takes the shape of the lung involved. This increased density is much less than the density of lung abscess or of pneumonic consolidation. The bronchial shadows are clearly seen through the shadow of the exudate.

Lung abscess may occur fairly early after inspiration of the foreign body, but it is remarkable that actual tissue destruction is postponed so long. Infection may arise in an area of drowned lung, in an atelectatic area, or following infected aspirated material. "We believe that when there is evidence of an infectious penumonitis in the distribution of the lower lobe bronchi that the inference should be that the lesion is due to aspiration of some foreign material goes to the lower lobe bronchi when they are small enough. In the second place, we know that a chronic infectious penumonitis or chronic lung abscess is the rule in foreign bodies of long sojourn." Radiographically, they conclude, at the Jackson Clinic that there is a definite infectious pneumonitis when the bronchial shadows cannot be seen through the exudate or the area instead of corresponding to a bronchial distribution is irregular with evidence of peribronchial thickening in adjacent lung tissue.

In examining the patient, both radioscopic and radiographic examination is necessary. Since the patients for the most part are children, one must have a definite routine. With the patient lying on his back, the arms extended and held firmly against the sides of the head, not being allowed to rotate, and the feet extended and held perfectly quiet, the chest is radioscoped. Expiratory obstruction is more easily visualized with wider excursion of the diaphragm so the child's crying is an aid to the examination. Plates should always follow in the same position, the minimum target distance being 36 inches.

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